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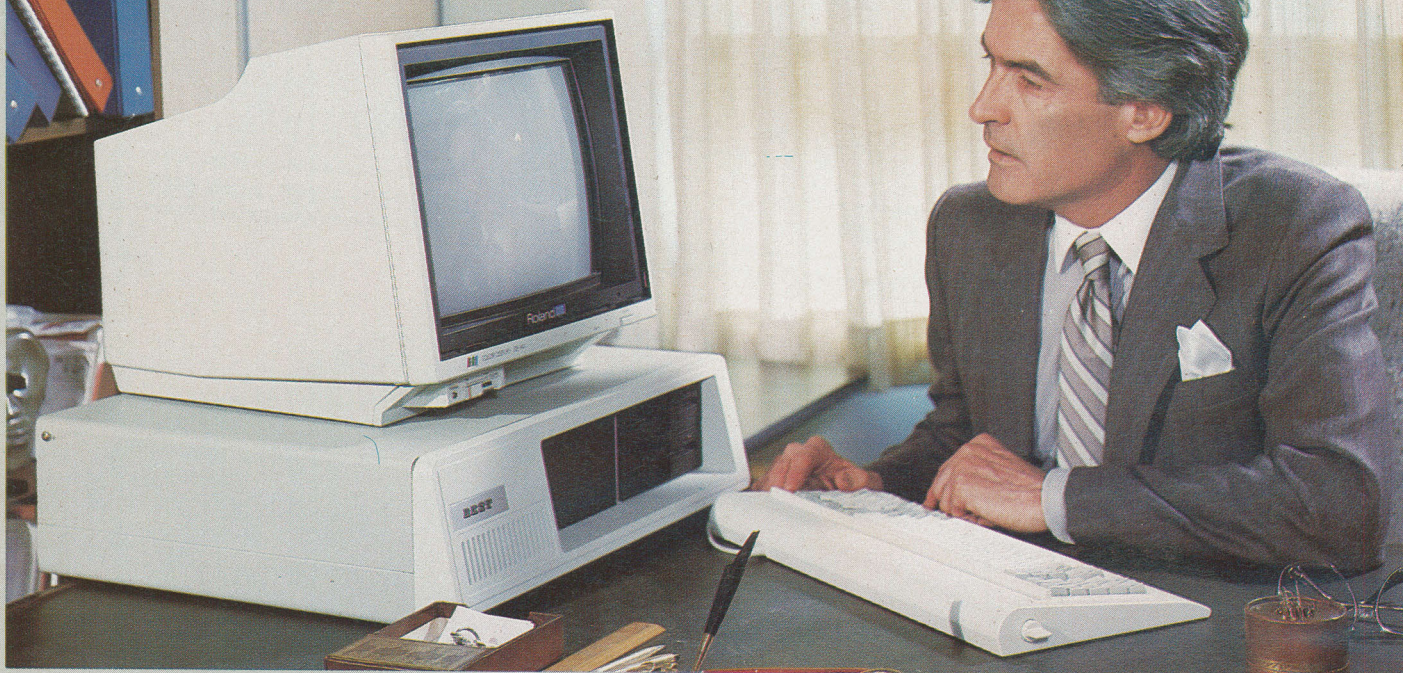


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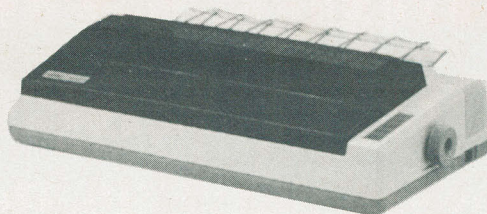
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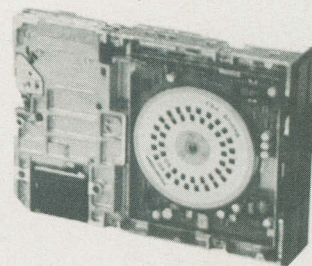
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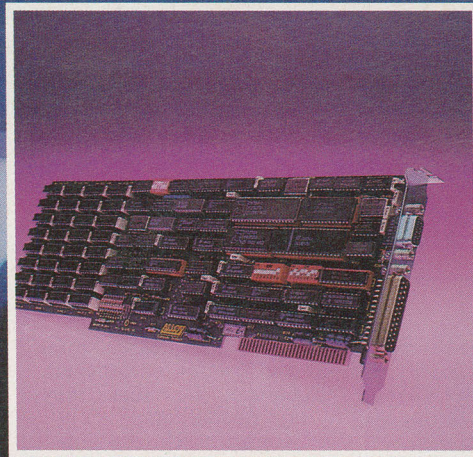
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The Birth of the 80386

One chip looks pretty much like another... but this one is pretty exciting despite its relatively boring exterior. It promises a new generation of more powerful microcomputers... that will still run WordStar.

by S.R. Ferrybridge

There are enough announcements of new integrated circuits in the average week to run a moderate sized woodburning stove just about constantly. Most of them... prereleases of parts destined for all but total obscurity... are usually at their best as fuel. However, the recent announcement of a new thirty-two bit processor by Intel, the 80386, transcends the boring tone of its press release and inspires one to thought.

The 80386 is, not surprisingly, an upwards compatible child of the 80286 that drives the powerful IBM PC AT and a lineal descendant of the 8088 that started it all. However, it has far more facilities than any previous chip, and promises a whole new generation of computers.

More Memory than Brains

The distinction between sixteen and thirty-two bit processors is a bit blurred at times. The 80386 is a true thirty-two bit processor, having both a wide address bus... we'll discuss that in moment... and the ability to handle thirty-two bit data as does the 68000.

Versions of the 80386 are available to run at up to sixteen megahertz. This compares favourably to the clock of the IBM PC, which runs at less than five megahertz. However, the internal architecture of the 80386 handles instructions differently than do earlier chips, making more of this increased speed than one might immediately think.

Among the advanced processing capabilities of the 80386 is an instruction pipeline, which allows it to decode one instruction while fetching another and executing a third. It has extremely sophisticated memory management facilities, allowing it to move a lot of data around extremely fast, as well as addressing huge memory caches.

The instruction set of the 80386 is upwards compatible with the 8088 and the 80286, which means that a computer built around it could run standard MS-DOS based programs. However, a lot of new instruc-

tions have been added, including thirty-two bit math things and instructions to facilitate task switching in a multi-task environment.

The 80386 can process three to four million instructions per second.

One can have the 80386 handle its memory in a number of ways. The memory space can appear as a linear chunk of RAM, just as it does in eight bit systems and under

the 80386. The segments can be any size up to four gigabytes long, with up to sixteen thousand segments. The chip will address up to sixty-four trillion bytes of memory.

The 80386 has an on-chip memory manager in hardware to facilitate its huge memory space and flexible memory modes.

The 80386 has more task management built into it than one finds in some operating systems. It allows one, for example, to run multiple tasks in multiple environments... say, having MS-DOS and UNIX on line at the same time. The chip can completely isolate one task from all the others.

Aside from a new clock generator chip, the 82384, the 80386 is fairly happy with most of the existing peripheral silicon for the 80286. It uses the 80287 math co-processor, the 82258 DMA controller and the 82586 and 82588 LAN co-processors.

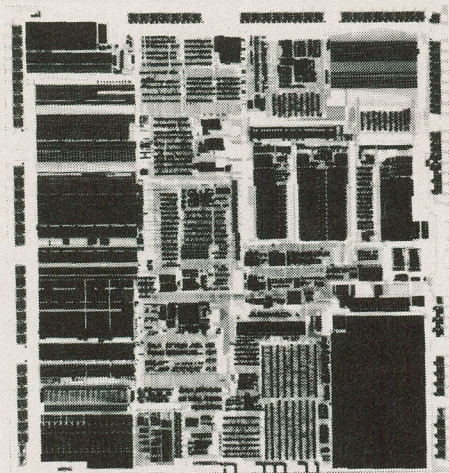
Intel has optimized PL/M and C compilers available for the 80386 environment.

More New Toys

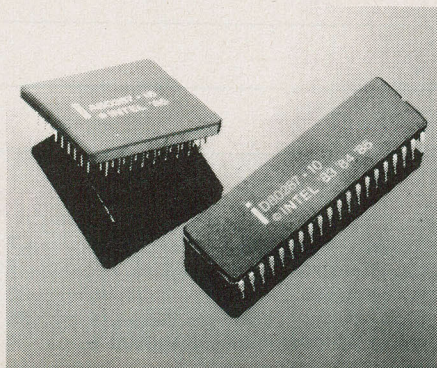
The potential of the 80386 is staggering. Easily as capable as many minicomputers, machines built around it could offer true multi-tasking with no loss of perceived speed for the humans using them. The enhanced speed and memory capabilities of the chip allow it to assume tasks which have up until now been the province of minis and mainframe, including advanced graphics, manipulation of large amounts of data, real time simulations and modeling and other processor intensive tasks.

Of course, it may be a while before you can get clones of these systems from Taiwan.

CNI



the 68000. This will bring light to the hearts of programmers who have cursed the segmented memory of the 8088. However, segmented memory is extremely useful for multi-tasking and, as such, is also available



COMPUTER PRESS

by Marie Hubbs

News

Owners of Apple II series computers can learn all about the tricks and techniques used to protect Apple software and make it uncopyable. The new monthly publication **Apple Software Protection Digest** from Redlig Systems will include articles on how to backup and/or unprotect software, various protection schemes and how to implement them, a history of software protection as it evolved on the Apple II, and reviews of books, software and hardware pertinent to the field.

With an annual subscription rate of twenty-four dollars American, the first issue is available free by writing Redlig Systems, 2068-79th Street, Brooklyn, New York 11214, telephone (718) 232-8429.

Circle No. 4 on Reader Service Card

Canada Remote Systems, a remote software exchange and bulletin board system, has added **2400 baud capabilities** to its service. Distributing public domain software for MS-DOS and CP/M, Canada Remote also provides Datapac service, which will reduce the cost of long distance access.

For more information about the more than 30,000 programs available to members, contact Canada Remote Systems at 4691 Dundas Street West, Islington, Ontario M9A 1A7, or call (416) 239-2835.

Circle No. 5 on Reader Service Card

Tymnet, the McDonnell Douglas Network Systems Company has announced that it will now offer **local async dial-up access** to its public data network in Toronto, Canada. With a local phone call, Toronto users can access the various databases available through the **TYMNET network**, as well as take advantage of its numerous value-added features and services such as built in protocol conversion, error correction and comprehensive network management. Tymnet plans to offer local dial-up access in five major Canadian cities by early 1986, and in every major Canadian city by the end of that year.

For further information, contact Tymnet Incorporated at 2710 Orchard Parkway, San Jose, California 95134, telephone (408) 942-5076 or -5209.

A letter of intent has been signed between **Nelma Information and Telecom Canada**, outlining a joint venture for the exclusive manufacture and distribution in Canada of the **Universal Teletex Controller**, an add-on device which will enable personal computers and word processors to exchange letter-quality documents in seconds, communicating through Telecom Canada's Teletex service. About forty times faster than Telex, the UTC will be offered in various models from a single user terminal unit for under three thousand dollars, to a model supporting up to thirty-two terminals, with leasing options available.

For further information contact Penney Edwards, Public Relations Manager, Telecom Canada, 770-410 Laurier Avenue West, Ottawa, Ontario K1P 6H5, (613) 560-3022.

Circle No. 6 on Reader Service Card



Apple Computers has agreed to drop its charges against Gentek, and Gentek will no longer be carrying the Apple II+ and IIe compatibles which Apple alleged were violating their copyright. According to Gentek Vice-President Brian Mintz, "it just wasn't worth our time to fight the Allegations"... "While Gentek will carry Apple peripherals, our main marketing thrust will continue to be towards the expanding IBM and accessories markets".

The new Commodore Amiga and much of its software will be on display at *The World of Commodore III*, December 5th to 8th, in the International Centre, Mississauga. For more information, call Tim Hawkins, Manager of Marketing Support, Commodore Business Machine, (416) 499-4292.

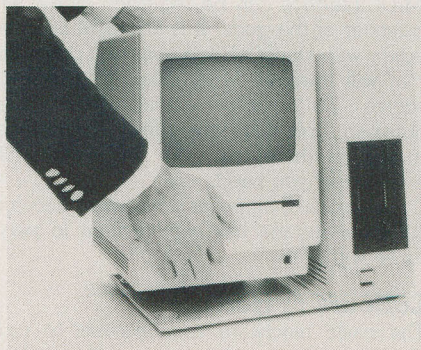
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New Products

Enhancements

● As promised, *Dayna Communications* is providing **free enhancements to all MacCharlie users**, version 2.0 of the MacCharlie application software. Now operational with Apple's Switcher, MacCharlie can reside as one of four application programs simultaneously in Macintosh memory. Also enhanced are the print selection and page setup functions, the file transfer, and the screen speed. The MacCharlie was reviewed in last month's Computing Now!

For further information contact Dayna Communications, 690 Old Base Line Road, Terra Cotta, Ontario L0P 1N0, (416) 838-2584. Circle No. 8 on Reader Service Card



Continued on page 70

Next Month
In

Computing Now!
Canada's Personal Computing Magazine

The First of the AT Compatibles

Building a working... and useable IBM PC/AT compatible... is one of the most demanding tasks many computer companies have ever undertaken. The dense complex boards and extremely sophisticated large scale integrated circuits that make the AT powerful have also made it incredibly difficult to build. In the next edition of *Computing Now!* you'll get a first hand look at the powerful features of this newest generation of business systems... and some useful things to look for when you actually think about buying one.

A Hard Drive for Next To Nothing

A hard Disk System can transform your computer from a mere byte juggler into a really astounding, powerful machine. Full disks will be a thing of the past and most of the delays that you thought were insurmountable will turn out to have been disk based, and will vanish in the night. Unfortunately, if you're like most of us, quite a lot of your money will follow it.

With a bit of ingenuity, a little persavance and the article we're going to run next month you'll be able to get a hard drive going on your system for hundreds of bucks less than these things usually cost. In addition, you'll wind up with a better understanding of how these things work, and how to keep the hard drive mice out of your toys.

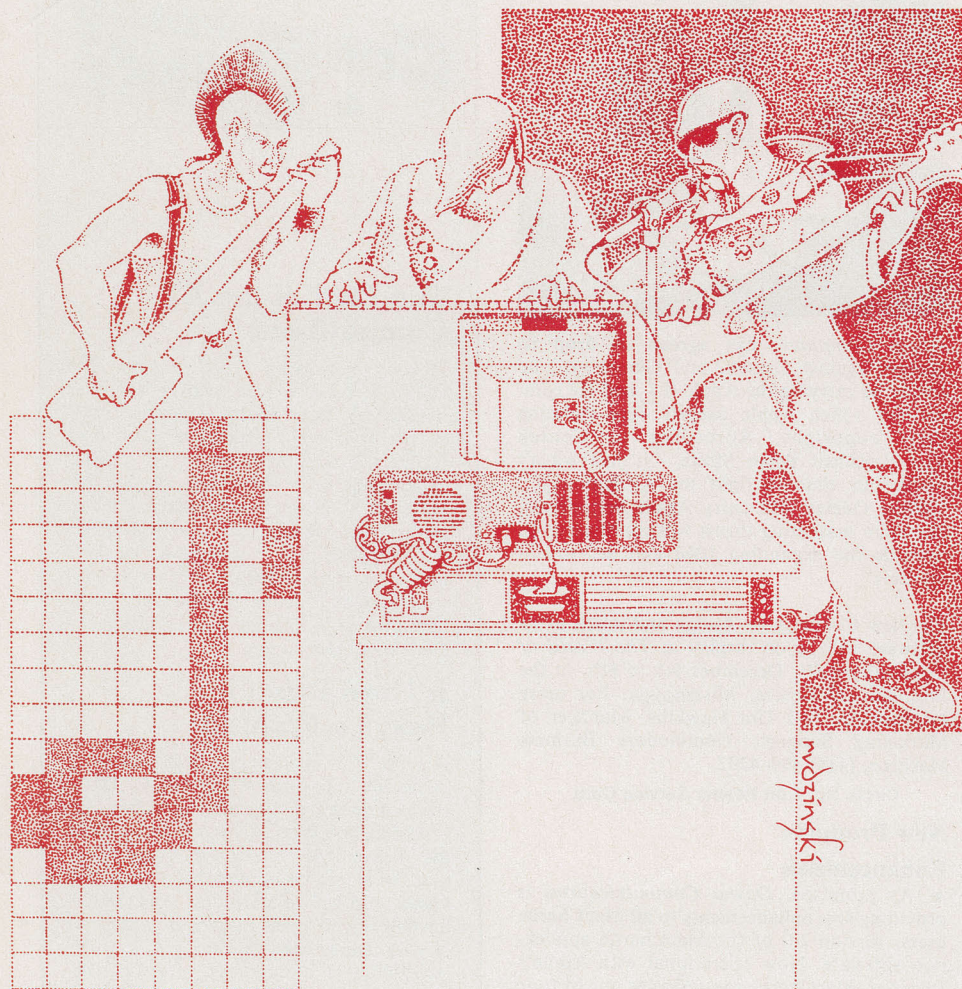
Llama Brothers Apple CP/M RTTY Decoder

Just when we'd thought there was nothing else to write for Apple CP/M this one turned up. Turn on your radio, plug in your computer and decode the beeps and bops. This program is especially designed to help one figure out which of the many protocols radio teletype signals are being sent in. It will check out news transmissions, various secret messages... most of them scrambled... amateur radio noises and a host of other data in the sky. Dust off your fruit.

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The Personal Composer Review

by Steve Rimmer



The toys for playing music with MIDI are involved in what the scientific types call a steep development curve. This might be translated as a warning to anyone thinking about playing long compositions on MIDI based equipment. If it's current when you start it'll probably be edging its way toward obsolescence by the time you reach the last few bars.

Almost as soon as there were MIDI interfaces for computers people started developing sequencer programs, software which would capture MIDI data... as emitted by a keyboard being played, perhaps... and stash it in RAM, to be played back and overdubbed. Given a sequencer one could turn one's computer into the analog of a multiple track tape recorder.

Unfortunately, most basic sequencer programs don't give one anything like complete control over one's MIDI data. Inasmuch as MIDI music in a computer is digital data, rather than sound, most players

sooner or later start itching to edit some of those notes. At the same time, one frequently would like to be able to get MIDI data into the system by hand... for those passages which are too complex to play in real time.

The Personal Composer package for the IBM PC and the Roland MPU-401 MIDI interface can be regarded as the sequencer of the gods. It is also a MIDI data editor without equal, and a scoring program that will translate MIDI music into printed scores. To a lesser extent it's a voice librarian, and there are a few other things tucked in there that you probably don't even know you need... yet.

Personal Composer is the finest piece of software anyone has ever written to play tunes with.

Labours of Hercules

The basic hardware requirements to run Personal Composer are anything but modest. It will run on anything compatible

Imagine a software package that gives one complete control of a MIDI music system, scores, does thirty-two track recording, handles voice libraries and allows for complete MIDI data entry and editing. Damages the mind just thinking about it...

with an IBM PC, but it's a memory pig of the first order. The program itself is well over two hundred kilobytes long. Loading it into a quarter megabyte will leave one with almost no useful work space. The one page Minuet I've shown here just fit into the left-overs of two hundred and fifty-six K.

At least three hundred and twenty kilobytes of memory are more or less essential... I use a half a megabyte, which has thus far allowed for anything I felt like doing.

Personal Composer is very graphics intensive, and, as such, its author obviously decided that the standard IBM colour card just wasn't up to it. As such, the program insists on seeing a better video card. It's happy with either the IBM EGA card or a Hercules monochrome graphics card. I used it with the latter, a glorious bit of fiberglass to be sure.

While one can compose with things thus far, one wouldn't be able to hear anything unless one had a Roland MPU-401 MIDI interface in the works and some sort of MIDI keyboard... or other collection of input and output... attached to the interface. I used the magnificent Yamaha DX-7 for the task.

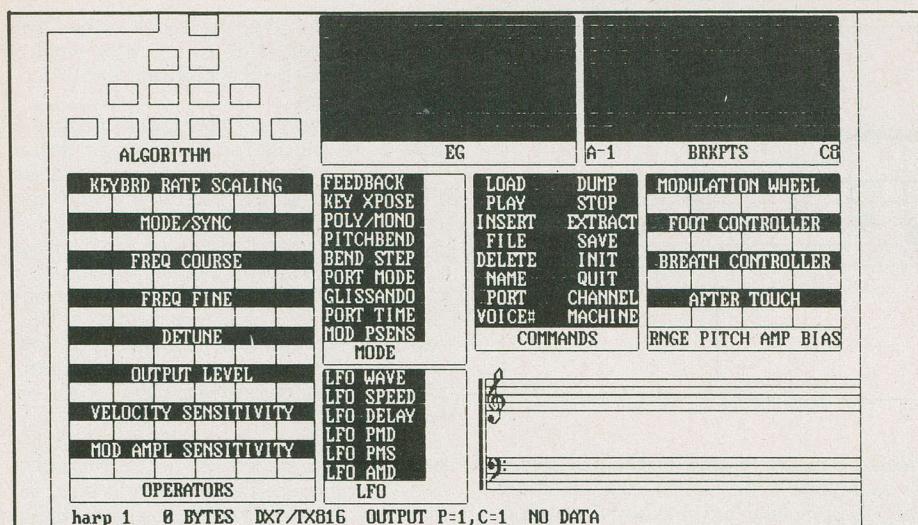
Finally, Personal Composer can render its music on paper through the use of a printer. Anything that's Epson compatible will be happy with it... I used a Brother Twinriter in its dot matrix mode, which seemed to be both sharper and faster than a real Epson.

The software can be used with a mouse if you have one. With its Hercules card, MIDI interface, two memory boards and a floppy disk controller, however, my five slot PC didn't have room for anything rodential, so I can't say how well this aspect of it works. However, as we'll see the program is well enough thought out that a mouse is far from essential.

Back to Basics

Personal Composer is, in fact, an integration of a number of the things one will want to do with a MIDI system. As such one can start into it from a number of directions. Perhaps the simplest of these is the scoring program. It's easily the most sophisticated part of Personal Composer.

Personal Composer



The voice manager

The edit mode of the package allows one to draw staves on the screen and stick notes, rests and other sundry musical phenomena on them. When told to, Personal Composer will translate all of this to MIDI information and play it... in real time... out through the MPU-401 and whatever is hooked to it.

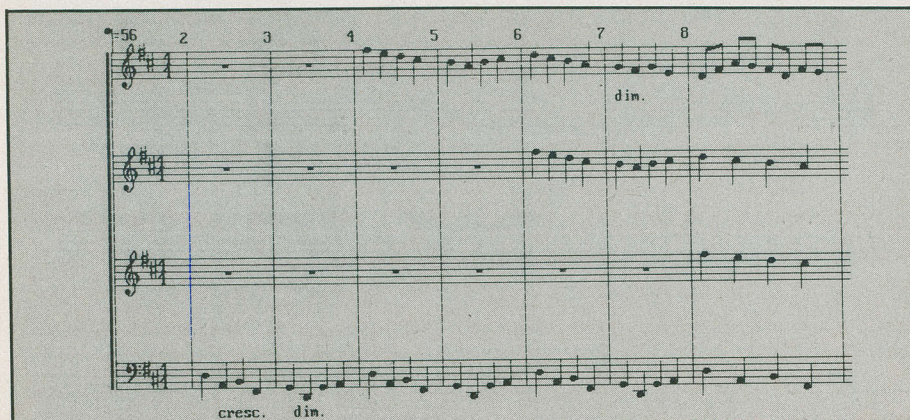
There have been several programs about which have done things like this... quite a number of them materialized for the Apple back when Mountain music cards were still high technology. However, Personal Composer actually gives you almost as much nuance and control as one would have in writing a paper score. One can place notes ranging in duration between whole notes and thirty-second notes. Notes can be joined together into groups, and linked into triplets and pentuplets. The package allows for ties of any length, although I couldn't get these to behave in quite the way I expected them to.

In addition, one can place all the usual sorts of rests on a score. Expressive notation, like crescendos, decrescendos and fermatas are all in there. There are bar lines, time signatures and the appropriate clefs available. The package can play in any key signature.

One can specify the tempo of a piece on the score... in addition, this can be manually changed while the piece is being performed. This is useful for switching the program into fast forward when you want it to get down to the end of a long piece. One can also specify MIDI commands in a score, so, for example, the performance can change voices on the fly in real time as a function of the performance.

One can have multiple staves bracketed together, allowing for a piece having multiple parts, all of which can be played in real time together. In getting into Personal Composer I transcribed Pachelbel's Canon into it... this arrangement is the usual three violins and a keyboard. The first few bars... included here... are a decent example of multiple staves.

What is quite important about Personal Composer is that anything which is put down on its screen can at some later time be removed from it. Notes can be inserted and deleted, even if they're tied up in groups. The software allows for block manipulations of notes in much the same way one would meddle with text in a word processor. This is extremely powerful... it allows one to copy repeating passages, transpose things to one's heart's content and move music



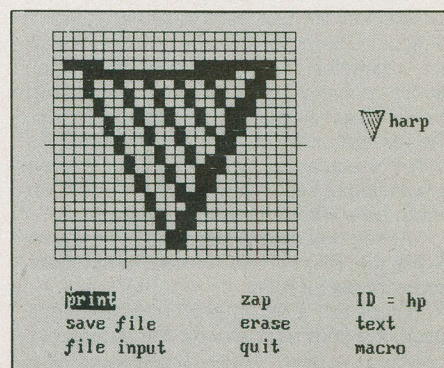
A score for four voices: Pachelbel's Canon.

around to allow for large insertions and deletions in a score.

One moves around the worksheet of Personal Composer with the PC's cursor mover keys. To skip around in larger increments capital R jumps right, capital L moves left, while U and D handle up and down. The home key brings the cursor to the upper left hand corner of the screen, while the carriage return goes to the extreme left edge and the end key to the extreme right.

The worksheet is infinitely long... if you have an infinite amount of RAM... and, when one fills one screenful of it one can page up and down with the PgUp and PgDn keys, which move in half screen increments.

The actual commands for Personal Composer are all entered in lower case. Commands take the form of two letter mnemonics... they're all pretty cleverly chosen and, as we'll see, if you really don't like one you can change it.



The MIDI graphic editor

One would place a note at the current location of the cursor, for example, by typing *n*. This would show a menu at the bottom of the screen of all the commands which begin with "n". These happen to be

n=natural, **f=**next file, **o=**note, **2=**overlay 2nd note

One would next hit *o*... after a while, one would just hit *no* and not even look at this first menu. The "o" submenu would come up

w=whole, **h=**1/2, **q=**1/4, **e=**1/8, **s=**1/16, **t=**1/32

If we selected *e*, the next menu would be

s=single, **n=**new group, **a=**add to existing group

Assuming that we wanted to place a single eighth note, hitting *s* would bring up

d=flag down, **u=**flag up

This is, mercifully, the last menu. Select one and a note would appear on the screen.

Notes are deleted from the screen by placing the cursor over the offending ones and typing *no* again.

One gets to be pretty quick at Personal Composer commands after a while. The menus flash by at the speed of one's fingers,

Personal Composer



A close up of a PC score

and *noesd*... that's the complete command sequence for a single eighth note with a downward flag... will come like one's own name after a while. However, one needn't contend with this in many cases.

There is a command... *ks*... which records key sequences. If one were to give Personal Composer the command *ks* and a two character mnemonic one could then record as many key strokes as one wanted into the macro defined by that mnemonic. The escape key ends the sequence. As such, for example, *noesd* could be stashed in something less involved, like *d8*, for an eighth note with a downward flag.

All the defined keystrokes can be saved in disk file, so you can create a permanent library of useful ones.

There are a lot of uses for these things which one finds as one goes. For example, I

created a macro to draw up the four staves for each page of the Canon, stick on all the clefs, the brackets and the key signatures. None of these things is extremely difficult... the command to draw a whole staff is a mere *st*... but it saved a lot of boring repetition. Besides, it's fun to watch.

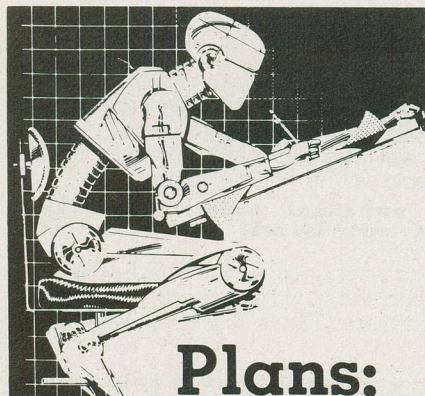
There's a file that comes with Personal Composer which consists of the entering of a whole piece recorded as a

single macro... type *xx* and it enters itself on the screen. This is not how stuff is usually stored by the program but it, too, is fun to watch.

By the way, as I noted, one specifies a note as having its flag either up or down. There's a command, *fn*, which reverses the direction of the flag of the note the cursor is on.

The command structure of Personal Composer's editor is beautifully simple to get into... in almost all cases the commands are the first two letters of the words they represent. It's amazing how quickly one can become quite fluent in it, placing notes on its worksheet about as fast as one would on a paper score.

The command to get Personal Composer to play a score is, not surprisingly, *pl*. This will cause the software to *compile* the score into MIDI data. Like everything else in Personal Composer, this happens almost unbelievably quickly. The Minuet here took about eight seconds, while the complete Canon, a rather long work which plays for about five minutes, loaded in less than forty-five seconds. This MIDI data includes things



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Minuett by J. S. Bach
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Personal Composer

like voice changes, volume parameters and so on.

You can change the speed of a performance while it's playing, using the PC's keyboard. It can be interrupted part way through, which returns control of things to the editor. If you play a piece for a second time without making any changes to it the software sensibly enough skips the compiling stage.

Real Time Boogie

The editor of Personal Composer is only one of its facilities. Giving it the command *rc* will pop into the thirty-two track real time recorder, a very sophisticated sequencer. It can be thought of as a multiple track tape recorder. Each track can be assigned to a different MIDI channel, and one can play back tracks while dubbing to others.

What is a bit magical about the recorder, however, isn't so much its ability to record MIDI data and play it back, but, rather that one can "convert" the stored music to score graphics which the editor can then manipulate. As such, one can play a piece on the keyboard and then use the editor to fix one's mistakes or add stuff one thinks of afterwards... or wasn't quite up to playing in real time.

The recorder has such niceties as adjustable quantization, which... depending on how you look at it... allows one to tell it how sloppy one might play and what

to do with the mistakes.

There is also a voice librarian in there... it's *li* from the editor. This remains a bit of mystery... for reasons I'll get into in a moment it's not all that well documented. There are a number of features which are, by the admission of the author, still under construction. This seems to be one of them to a large extent.

Finally there is the *MIDIgraphic* editor, which allows one to create custom graphics symbols for use on one's scores and assign them to two letter mnemonics. The Minuet here uses a couple of these, one for a viol and one for a harp part way down. If I was into more involved music notation I could have probably found uses for *MIDIgraphics* in the score itself, to denote things that Personal Composer doesn't have symbols for at the moment.

One of the features which is due to be added to Personal Composer in a future update is the facility of attaching MIDI code to the *MIDIgraphics*. At the moment, for example, my harp symbol doesn't do anything... I have to manually put in the *p29* which switches my DX-7 to its harp voice. With this new bit added it will be possible to plop down the harp symbol and have Personal Composer add in the MIDI stuff to change the voice of the DX-7.

Grace Notes

To know Personal Composer is to be

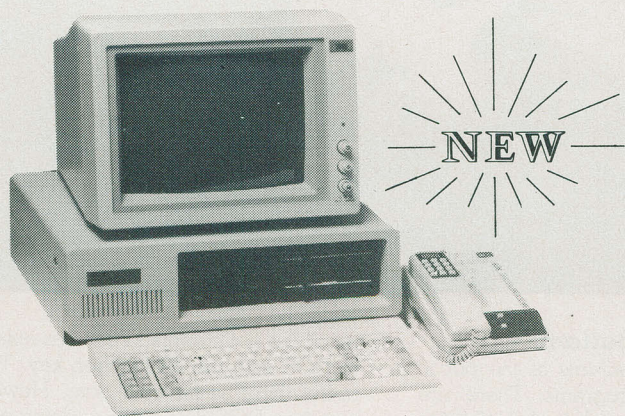
blown away by it. It is the ultimate MIDI tool, and promises to get better still with future revisions. It's fast, user friendly, flexible as a rubber politician and gloriously suited to the task it was written for. It only has one real catch, this being its manual.

Most software packages come with large, verbose manuals... as a minor hook to keep one from pirating them, me thinks. Copying disks is easy... xeroxing manuals is tedious. Personal Composer has taken the other extreme... the manual is on the disk, presumably so that the author of the package can update it without constant recourse to a print shop. However, the manual is a bit terse.

The manual is seven pages long when one prints it out. It's the soul of brevity concerning some areas of the software's operation. If you are tight with MIDI and reasonably familiar with music notation this probably won't slow you down too much. Things like the librarian could have used a lot more expounding upon. If you're a bit new to all this you'll get Personal Composer together in time... and it's worth the effort... but plan on a bit of a struggle.

The documentation aside, Personal Composer is a splendid work. If you own a PC and are getting into MIDI music you should plan to acquire Personal Composer even if it's the only other thing you ever buy. **CNI**

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Public Domain Software for the IBM PC

There is a lot of great software in the public domain ... and a lot that isn't.
Here's a look at some of the better programs that are to be had free ...
or almost free ... for the asking.

by S.R. Ferrybridge



As with virtually all the computers that have issued forth from the back rooms of the twentieth century, the IBM PC has engendered unto itself a growing library of free software. It is often said that the free stuff is better than the paid for stuff... this isn't a notion that the software manufacturers like one bit. At the very least, much of the free software is more innovative. Much of it is more fun. All of it, of course, is a lot less of a drag to acquire.

One of the things that the public domain has in common with the realm of commercial software is that quite a lot of what exists in it is sort of awful. There are a few real jewels in there, though... in this article we're going to look at some of the better stuff.

Starting At the Bottom

The most common denizens of the public domain are utility programs. There are some souls who collect disks full of these things, sort of the way you see a lot of dentists and chiropractors driving around the country on the weekends looking for old glass telephone line insulators. However, some of these things do have considerable value in making your computer a better place to live.

The most powerful utility I've come across is one called DOSEDIT. It's a sort of a glorified replacement for the F3 key. It usurps the decidedly low budget line editor of DOS with the one they should have written in there to begin with.

Under normal circumstances one can

recall the last command one has entered into DOS with the F3 function key. This is a useful thing as far as it goes. However, if one runs DOSEDIT prior to doing any typing one can do all sorts of other things to the command line.

DOSEDIT sets up a two hundred and fifty-six byte circular instruction queue. This means that when one gives DOS a command, like DIR or BASIC, the command line is stashed in memory. If one thereafter hits the up arrow key on the keypad the most recently typed command will reappear, in much the same way as the F3 normally makes it do. However, hitting the up arrow key again will bring back the next to most recently typed command. One can step through the whole stack this way.

Public Domain PC

The down arrow key steps forward through the stack. Both keys wrap around, so if you back up far enough you'll come back to where you started.

If you type enough commands to fill the queue the earliest commands will be deleted to make room for new ones. As such, one always has a couple of dozen of one's most recently typed commands available by zapping the arrow keys.

DOSEDIT also allows one to edit the current command line. Edited command lines join the queue as new commands.

DOSEDIT is small... about two kilobytes long... and can be included in one's AUTOEXEC file to avoid having to invoke it every time one's system is booted. It saves an enormous amount of typing.

Sorted directory programs began life with CP/M. There are countless D.COMs about for eight bit systems. They are equally as applicable to DOS, which also presents its directory information in fairly inconvenient forms. One would invoke a sorted directory program rather than typing DIR. Most of these are small enough to boot almost instantly, and operate almost as quickly as the DIR command does.

A typical sorted directory program will take that part of the directory which one has selected... or, as is usually the case, all of it, if no command line argument is offered it...

and sort it alphabetically. The screen display will usually show each file name with its size and possibly its date of creation.

There are two commonly found sorted directories for DOS, these being SDIR.COM and D.COM. The SDIR program is a fairly elaborate affair which shows one everything there is to know about a file,



but does it in a more useful way than does DIR. The D.COM program is more like a CP/M style D.COM, rounding the file sizes off to the nearest K and ignoring things like the date and time. As such, it manages to get all the files in all but the most overfilled directory into a single screen.

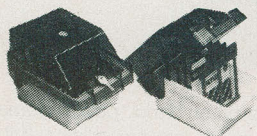
Copying a lot of files from one disk to another... when there is no wild card match pattern to do it for you... is supremely tedious. There are two utilities which will make this a lot easier. One, CSWEEP, is similar to the CP/M SWEEP and DISK programs. It generates a list of the file names in a directory and allows one to tag the ones one wants. One can move up and down the list. When one has all the files one wants to copy tagged one hits M and the name of the drive one wants the files to wind up in. The program moves down the list, copying each one.

The other variation on this is VFILER, which is also derived from a CP/M based program. Its command structure is essentially similar to that of CSWEEP, but it's quite a bit smaller and a lot more graphic. It displays the files of a directory sorted on the screen... like D.COM. One cursor about tagging the files one wants to copy. It looks a lot slicker, to be sure.

Both of these programs also let you delete and rename files.

PCBOSS is a sort of next generation VFILER. It's a shell that runs in DOS but replaces all of its normal commands with menus. It shows you all the files in your current directory and lets you do the normal things with them... copying them, renaming them, typing them, deleting them and, most

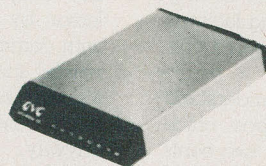
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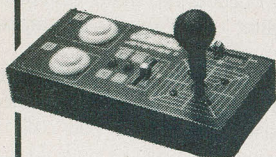
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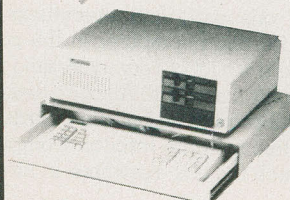
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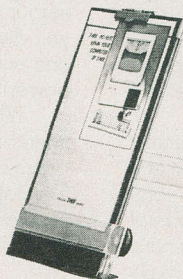
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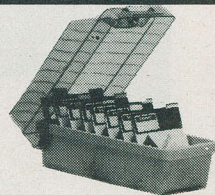
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- COPY HOLDER



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- FACTORY NOTCH



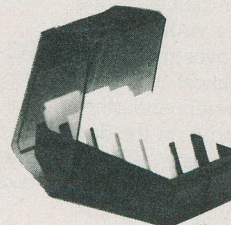
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Public Domain PC

importantly, executing the programs among them.

PCBOSS is arguably easier to use than is DOS... there's far less typing, and virtually no tricky commands to learn, as everything is handled from a series of menus.

There are a number of clock programs around for DOS. These things run as interrupt driven background tasks which print the correct time somewhere on the periphery of the screen, updating it once a second even while you're running applications software. There's a nominal reduction in processor speed for this. The tricky bit about clocks is that there are different ones for different cards... there has to be, as these things actually poke the clock characters into the screen RAM rather than printing them, and the screen RAM lives in different places for different cards. See the article on display cards in this edition of Computing Now! if you're a bit confused about this.

Backscroll is another program that puts hooks into DOS, in a way similar to DOSEDIT. However, with backscroll in place you can scroll backwards through text which appears to have scrolled off the screen. Along these lines, BROWSE can be used instead of TYPE to allow one to move through text files in both directions, in much the same way as one might with a word processor.

Higher Levels

Moving beyond the range of simple utilities there are quite a number of far more profound packages floating about the public domain. Profoundest of the lot... well, I'd argue it to be so... are the games. There are some really evil games to be had.

The most interesting and potentially addictive of the public domain games is one called CASTLE. It's a sort of visual adventure game in which one moves through a series of rooms in an almost deserted castle... there are a few monsters and other nasties floating about. I found it on the day of the great snow storm last year... it killed about six hours while we were waiting for the hundred and eleven car pileup outside to be moved so we could all go home.

There are public domain versions of both FROGGER and ZAXXON which are really brilliant. Both are fast with splendid graphics and are every bit as exciting as the arcade versions. Neither one sucks quarters, though... a positive advantage, to be sure.

If you want some really classic games to add to your collection of old nameless disks, you'll have to have MOON and BREAKOUT. The former is a lunar lander simulation in the finest traditions of Commodore PET 2001's, while the latter does the standard Apple style exploding handball simulation even better than an Apple can.

There are quite a few music programs for the PC... generally these consist of baroque pieces transcribed into the music sublanguage of BASIC. Among these are BACH, MAGDALEN, ANITRA and SOLFE. They're interesting to listen to... they'll give you a headache if you listen to 'em long enough.

Among the more practical programs one finds, few are more practical than Qmodem, the nicest telecommunication program anyone has ever dreamed up for the PC, free or not. There are countless versions of this around, ranging from a not quite perfect beta version up to... I think... the current version 1.07. This latter one is a treat, with a well thought out command structure, windows, configuration menus everywhere, automatic dialing, a text buffer, lots of download protocols... the list is endless.

For the less technological, there is

have been used as special effects in movies and such. While just a bit slow... a fractal takes twelve to sixteen hours to ooze onto the screen... it's unutterably fascinating.

Finally, there are several RAM disk programs around which you'll want to have a look at. The most flexible of these is called MEMBRAIN, which allows you to have a disk of any size you like... and have memory to support. These programs are, as a rule, quite well done, and require no technical hacking to get going. RAM disks can speed up things like word processing, graphics packages and spread sheets enormously.

But Soft...

There is a place for commercial software... without it, the copy protection companies would have nothing to protect, and the copy unprotectors would have nothing to attack. There would be a lot of people looking for jobs, which would be regrettable.



PC-WRITE, a public domain word processor. It isn't quite up to being WordStar, but it's pretty powerful. It has lots of help screen and all the text manipulating facilities one normally expects to find in a word processing package.

If you are into money and understand things financial... like why the post office returns letters if they're short by two cents but doesn't give you two cents back if they're over... you might want to have a look at FOS. This is a fairly elaborate financial management package that balances one's cheque book, keeps one's budget and takes care of all the things you need to know in order to remain solvent and cheat on your taxes.

Even if you don't understand imaginary numbers at all, you should have a peer at a program called FRACTALS. It is a computer simulation of the Mandelbrot microscope that was discussed in Scientific American a while back. It generates really splendid FRACTAL images, of the sort that

On the other hand, public domain software is so much less expensive. If it fails to do what you want it to do you can teach it a lesson by reformatting it. You can do this with commercial software too, but it's very painful and half the time the disks have Prolok laser holes burned into them, and aren't much use after they've been erased anyway.

If you like a public domain program you can pass it along to your friends without feeling the least bit guilty. If you call the author of one you won't be put on hold until you die of natural causes. If there's a bug in one somebody will eventually fix it. Very powerful features, these.

While one can't find everything one needs to use one's computer in the public domain there is a lot of very interesting stuff. This list is only some of it. All of it's available on most public domain bulletin boards and as almost free software through Computing Now!... catch the ads elsewhere in this edition.

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IBM PC Video Display Cards

Seeing what your PC wants you to see is more than just finding the tube and staring at it. There are several options available for souls who want to see things differently ... here's a look at what those cards do.

by Steve Rimmer



The most sophisticated computer in the known universe is nothing without a display of some sort. Microcomputers... being personal and interactive and generally friendly... are very tight with their displays. The technology of tubes and how to dazzle them has been as much a part of the advance of personal computers as have been the chips and programs.

The IBM PC's display is unquestionably one of the things which has seen it so widely accepted. One may have good cause to bemoan its lack of speed and a few of its hardware peculiarities, but it provides one's software with a flexible, standardized way of spewing visual stuff out to the real world.

What might get a bit confusing, however, is the variety of displays one can have plugged into an IBM PC... or, of course, something compatible. Unless you've really had a long and dizzying look at all this fiberglass, the display card foxtrot may still have you tripping over your feet.

In this feature we're going to have a detailed perusal of the cards one can blast into the PC and... perhaps most important... what all the connectors are for.

Dots in the Darkness

Unlike as in the case of simpler computers, such as the Apple II+, the video section of the PC lives on a dedicated card. As such, one can plug in the card which bears the most useful video configuration for one's needs. While there are actually quite a few esoteric video display adapters for the PC, there are only three that one comes in contact with in most cases.

The most common card is what IBM calls the *colour graphics adapter* and the rest of us know as the colour card. This... or some minor variation on it... is what comes with most of the compatible systems one en-

counters. It's something of a jack of all trades among video adapters... it will do everything to some extent, but it's no great wonder at any of them.

To understand what the colour card does and why, one must have a rudimentary understanding of what goes on in a display card. They all work in more or less the same way, so you'll only have to read this bit once.

The basis of the colour card is a chunk of memory which the thick manuals with all the inscrutable formula call the *display buffer*. It lives on the computer's memory bus just like all those RAM expansion boards one sees... and just like the system's main memory. In fact, one could load information into it just as one would any other bit of RAM and something would show up on the screen as a result. It probably wouldn't be what one expected, however. We'll get to that.

The colour card's memory isn't included in the system's memory count... if one has a quarter meg of RAM in one's system this ignores however much memory the colour card may have on it. The colour card memory lives above the system's normal memory address space, starting at segment 0B800H. Don't worry about that rather nasty looking hex number... it isn't really part of this discussion.

The circuitry of the colour card takes the information stored in its display buffer and changes the patterns of dots on the screen based on it and on whichever mode the card is in at the time. Allowing that we have some software... such as the system BIOS... to stash information in the buffer so as to make some sense to the card, useful text or graphics will show up on the tube.

The colour card has sixteen kilobytes of memory. In text mode, one screen requires four K of data. This means that there are four unique pages of data which can be held in the screen buffer at any one time. It's actually quite practical to switch around between them... some software uses this facility to arrive at very fast screen changes, although it isn't really of anything more than passing interest from a user's point of view.

If you think about this for a moment you'll realize that there's a discrepancy in these numbers. There are two thousand characters on the PC's screen but it wants four thousand bytes to display them. In fact, every character which appears on the screen is held in two consecutive bytes in the colour card's memory. One byte holds the ASCII character value itself, while the other holds its *attribute*. A character's attribute determines what colour it is, what colour its background is, whether or not it's flashing and what its intensity is.

You can prove all this for yourself if you want to. This is a BASIC program which will display some characters without printing them. It POKES data directly to the screen RAM of the colour card.

```
10 DEF SEG=&HB800
20 AS$="There once was a lass from
Regina"
30 FOR X=LEN(AS$)
40 POKE X*2,ASC(MID$(AS$,X,1))
50 POKE (X*2)+1,2
60 NEXT X
```

Some of this may be a bit mysterious. Line ten points all subsequent POKING to the segment which holds the colour card's memory. The rest of the program extracts each character in turn from the string and stashes it in the display buffer. Line 50 sets the next byte along after the character to two, which is green for the colour card. Make this a hundred and thirty and the text will flash.

The card has a number of display modes besides the usual eighty by twenty-five text display that we normally encounter. There's a forty by twenty-five character mode... you've probably run across this if you've played with BASIC bit. It's characterized by looking really ugly. These two options constitute the normally encountered text modes of the colour card.

The text modes are what are called hardware display systems. The patterns of the characters that you see are determined by a ROM on the colour card which holds their bit maps. Thus, a single byte, say the number sixty-five, causes a shape to appear on the tube which looks like the letter A... if you don't get it in the attribute byte by mistake.

When one puts the number sixty-five into a character byte on the screen the colour card's hardware turns on the appropriate dots, or *pixels* to form the character.

There are also two principal high resolution graphics modes... actually, strictly speaking there are three. These allow one to individually switch on whichever pixels one wants to. In the medium resolution mode this allows for a matrix of three hundred and twenty by two hundred pixels, with each pixel being one of four colours. This requires the full sixteen K of memory to contain one screen's worth of pixels. The high resolution mode allows for twice the horizontal resolution... a full six hundred and forty pixels across... but only two possible colours. In other words, each pixel can either be on or off.

In these modes one can still display characters on the screen, but these work in a very different way from the ones in the text modes. There is a second set of character patterns in the PC, these being stored in the system BIOS ROM. If one calls for text to be displayed while the colour card is in a graphics mode the BIOS will paint the characters pixel by pixel in the appropriate location of the screen.

This, of course, makes text display in the graphics modes a good deal slower than it would be in the proper text modes. It also means that... in some compatible systems with peculiar character sets in their ROMs...

the text in the graphics modes can look markedly different from those of the colour card's ROM.

And Now... The Interface

If you look at a black and white television and a colour television side by side you'll probably notice that the black and white one, while probably not as interesting, has better picture definition than does the colour one. This isn't always so... don't try the test with one of those eighty dollar plastic sets from Woolco. They have very nearly no definition at all.

The reason for this increased image quality is fairly simple. Every pixel on a colour display... whether one is watching Lotus 1-2-3 or Masterpiece Theater... is made up of three coloured dots. A black and white tube represents each pixel as one dot, and, as such, has the capability of looking a lot sharper.

There is more to it than this. The colour card can drive two sorts of monitors, these being composite monitors and what are called RGB... that's *red*, *green* and *blue*... colour tubes. These are both inherently limited resolution boxes.

Composite monitors are the most common sorts, and encompass both monochrome and colour displays. The eternal Zenith 122s, among others, fall into this purview. These things take all their video information in over a single cable, usually terminated with an RCA plug. This, in itself tends to limit the frequency response of the whole affair and, as such, the resolution of the picture. However, in all fairness, you can get much better results out of a cheap Zenith green screen than the colour card is capable of rendering on it.

Composite colour tubes aren't really a lot of use with a colour card... at least not in the eighty character modes. The definition of such things, coupled with the already funky composite signal of the card itself, makes most things displayed on them look like the aftermath of hurricane Hazel.

The RGB monitors are unquestionably a better output for the colour card. These attach to the nine pin D shell connector one usually finds in close proximity to the composite output out back of the card. An RGB monitor takes a "non-composite" signal in, one with the individual colour components split out onto different lines. As such, it gets the picture image without its being combined into a composite signal and then uncombined at the other end of the wire. Things are a lot crisper this way, and certainly the best that the colour card can do... but still of only passable resolution for text intensive stuff.

The colour card is a good compromise if you want both text and colour graphics. It's compatible with lots of software, including a lot of games which will only work with this display. However, if your needs are more specialized you might want to con-

Video Cards

sider some of the things one can use to replace the colour card.

All The Wold Is Green

The other option which one can get from IBM... and one which is available far less readily as a compatible board... is the mysterious *monochrome display adapter*. This is a rather more specialized video section than is the colour card... it has no graphics other than those little block graphics characters, but it is supremely

sharp in its text modes, as compared to the colour card.

The monochrome card can be thought of as being a colour card without the colour... or the ability to do high resolution pictures. However, what it does do is to provide very high resolution characters out to yet a third sort of monitor. We'll get to all that in a second.

Like the colour display, the monochrome card has a chunk of memory to use as a display buffer. In this case it's on-

ly four kilobytes long, as there is no need for a lot of RAM to be used in case the thing is set into a graphics mode... inasmuch as it doesn't have any. This corresponds to one page of the colour card's four display pages.

The arrangement of two bytes for each character is also found in the monochrome card, although the attributes work a bit differently as there is no colour to contend with. The monochrome card's display buffer lives at segment 0B000H, rather than 0B800H for the colour card. Once again, these numbers aren't really important to a user.

The reason the display of the monochrome card looks so nice is largely due to the way in which it drives its monitor. The tube one connects to it is called a *TTL direct drive* monitor, which is similar to the other sorts of monitors we've discussed only in that it has a tube and will explode if it's thrown from a high building.


Unfortunately, TTL monitors use the same nine pin D shell connector as do RGB colour tubes, which has managed to confuse rather a lot of people. One can't plug one sort of tube into a card that wants the other sort. Nothing nasty will happen so far as I know if you try it... you just won't see a picture.

A TTL monitor... often called a *separate sync* monitor... is capable of producing a really splendid image because it gets all of its signals on individual lines. As such, they can be very fast... the monochrome card wants to see a screen with a resolution of eighteen megahertz, or about three times that of some of the things that one finds plugged into a colour card.

One of the really superb separate sync tubes I've had the pleasure of staring at is the Roland MA-122A. This is an amber monitor... there's a green version about as well.

Having extolled the virtues of separate sync monitors a bit... I'll be extolling them again in a moment when we get into the last of the cards... it would be remiss of me to skip the fiscal realities of these things. While Zenith green screen composite tubes are fairly cheap... often approaching a hundred bucks and change... separate sync displays are still weird enough to have kept them expensive. They're rarely seen below two and a half bills. As such it might be worth noting that there is another approach to having one if you're broke and likely to remain that way for a while.

Raw separate sync monitors... ugly guys with no case or power supply... are available really cheap. I got one from J and J Electronics of 310 Notre Dame Avenue, Winnipeg, Manitoba R3B 1P4 for about thirty-five bucks for this article. These things are actually pretty simple to get going, being electrically what's inside a store bought TTL monitor. They aren't nearly as



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Video Cards

pretty to look at and they resemble a transistor radio in a blender unless you devise cases for 'em. However, they do offer one a really cheap way to get a TTL interface tube going.

This is especially useful if you are going to use a Hercules card. We'll talk about this little wonder in a moment. The catch with the Hercules card is that there is some software, such as Personal Composer, reviewed elsewhere in this edition of *Computing Now!*, which absolutely insists on having a specialized display with an expensive TTL monitor... whether you can afford one or not.

If you are going to play with a lot of text oriented stuff and don't really care about pictures a monochrome card may be a better party than would be a colour card. However, the third member of the band may well be the best of both worlds for a lot of applications.

Old Dusty Greek Gods

The Hercules card was not developed by IBM. It's one of several third party replacements for the IBM cards. It's about the only one that turns up a lot, however. It's arguably the best.

The Hercules card is capable of both text and graphics. It has a higher resolution than do either of the previous two cards, being capable of rendering seven hundred and twenty by three hundred and forty-eight pixels on the screen. Coupled with a separate sync monitor... the only thing the Hercules card has any interest at all in being coupled with... it produces a picture which looks like it might have been generated by a Lisa, or one of the moderately expensive dedicated graphics terminals that the corporate minicomputer types use.

The only thing that the colour card can do that the Hercules card cannot is, of course, generate pictures in colour.

This high resolution of the Hercules card has a few drawbacks. For example, existing graphics programs... such as BASIC and a lot of software written in it... tend to draw things a tad small, and usually require some rewriting for use with the Hercules card if they aren't designed to be configured for it. Text oriented software generally works just fine, but the text looks worlds crisper and more readable than it ever could on a colour card. Some text based software, such as Lotus 1-2-3, for example, requires a special installation procedure to make it run properly with a Hercules card.

The Hercules card holds sixty-four kilobytes of memory for use as a display buffer... which is as much RAM as most eight bit computers have in total. It lives in segment OB000H.

Like the colour card, there are a number of Hercules compatible cards about. It's probably worth speaking about



these things for a moment as well. The real Hercules card is a very well engineered bit of plastic, and some of the compatibles work quite acceptably. I've used one called the

IF#129Y monochrome graphic printer card from Donatec, which is pretty good. Most of the North American built cards are decent. One should, however, beware of some of the weirder far Eastern imports... a few of these are reputed to be turkeys of the first magnitude, introducing numerous compatibility problems with software which is usually comfortable with the Hercules card.

One is usually inclined to use the card that came with the computer... it's a fiscal drag, to be sure, to replace a three or four hundred dollar board just to make the picture look a bit nicer. However, many compatible systems now offer one a choice of cards when you buy 'em... it's worth checking out the options.

If you consider just how much time you spend squinting at the glass, it's probably worth considering getting a card which is properly suited to what you're doing. It can save you a fair bit of time... you won't have to call in a second opinion to consult on the meaning of a pattern of fuzzy blotches on the screen which might well be characters of some sort. It can also keep your eyes from feeling like hot golf balls by the end of the day.

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Some Advanced Features of Lotus

Making your spreadsheet do everything it can do is often an exercise in knowing things the manual is reluctant to tell you. Here are some of the nicer bits in Lotus and Symphony.

by G.J. Ambeault

Many people don't use their spreadsheets to their full advantage largely because they don't understand the more complex aspects of their manuals. This is particularly true when one tries to use features like *if then* statements and the lookup tables. However, if these functions are understood and implemented the power of a spreadsheet can be multiplied many times.

In this article we will review the use of these two valuable features of LOTUS 1-2-3. In order to provide an example that we can all relate to, I will take portions of the 1983 personal income tax return and show how these functions can be used in this common problem.

Conditionals

Let's begin with the *if then* statement. The format of this command is

@ IF(argument,true,false)

Where the *argument* is either a cell location, a number or an arithmetic logical variable which is evaluated to obtain a true or false condition. The *true* is the course of action taken if the argument is true. It can be a formula, a number, another *@if* statement, or other logical operands. The *false* is the course of action taken if the argument is not true. It can also be a formula, as with the *true*.

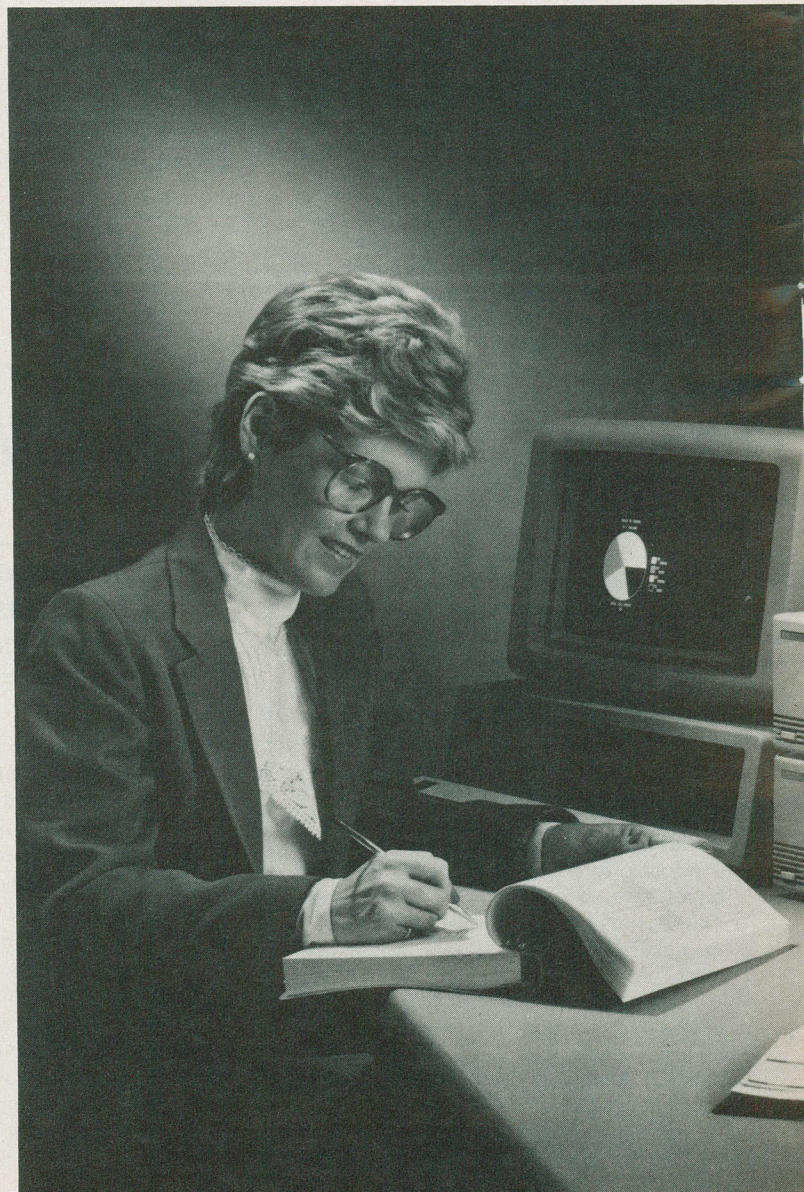
This command is used to facilitate the logical selection of a group of items. In our example we will utilize this function to show whether one is entitled to a refund or must pay additional income tax.

There is one additional item included to make this example slightly more difficult. Because the government will neither refund your money or expect payment if the difference is less than a dollar, we must provide the extra logic to handle this. This would work as follows.

In cell M8 the amount of the total taxes payable is entered. This figure can be entered now on a blank worksheet, for our example enter \$2,000.00. Into cell M9, enter the amount of your tax credits. In this example we will use \$2,400.00. The formula in M11 is a simple one,

(M8-M9)

and gives us the answer \$400.00. We must now determine if this answer is to be transferred to K13, the refund, or to M13, the balance due.



If the value at M11 is a negative number then it will be a refund, otherwise it is a balance due. We must also ensure that the amount is at least one dollar in either direction. Accordingly the formula in M13 will be

@IF(M11>.99),M11,@na)

To explain this a bit more fully, the argument, *M11>.99* will be true if the difference is greater than .99. If it is true copy this cell from cell M11. If the argument is false print the characters NA.

A similar formula can be used in K13, but we will convert the amount from a negative one to a positive one for esthetic reasons, so the formula becomes

@IF(M11<-.99),(-1*M11),@na)

This one works similarly to the last one. The argument *M11<-.99* will be true if the difference is greater than negative .99. If it's true the sheet will copy the difference from cell M11 after multiplying it by negative one. If it's false it will enter the characters NA.

To prove that this works in every case, enter the following values into cell M4 to obtain the results shown in table one. If your answers match the above figures, you have entered all the items correctly.

Table One

M8	K13	M13
\$2,000.00	\$400.00	NA
\$2,399.01	NA	NA
\$2,400.01	NA	NA
\$3,000.00	NA	\$600.00

Look Up

While in this discussion we will use the vertical lookup function, the concept is similar for the @HLOOKUP horizontal lookup. The format of this command is

@Vlookup(argument),(range of lookup table),offset)

The *argument* is the value to be tested against the lookup table, and return the appropriate number. The *range of lookup table* is the co-ordinates of the upper left and the bottom right cells of the table. You must separate the addresses with a period. The *offset* determines how many columns to the right of the comparison column to look. This feature allows you to use a table for more than one use.

This function allows you to choose one figure from a group of numbers arranged in a columnar format such as the appropriate tax rate percentage or the dollar value of taxes for our example.

Before we begin you should change the widths of columns J,L and O to 11 and the width of N to 4. Columns K and M remain at 9. Format L38 to L40 and O39 to O42 as currency 2, K26 to K36 and N40 as percentage 0. The information entered is from the 1983 General and Individual Income Tax Return. Commencing in column J line 26, enter the taxable income amounts from the detailed tax calculation table on the form. Begin with a 0, to provide a base point, enter the other figures and end the table by entering a large figure, like 9999999.

In column K enter the percentage figures from the same table, this time ending the table by repeating the last figure. In column L enter the tax amount and repeat the last figure. In column M merely copy column J. The table is now complete.

We will use this feature in three places, the first to lookup the level in taxable income for the beginning of the calculation, the second to determine the amount of tax on the amount just deter-

mined and the third, to determine the appropriate tax percentage to apply to the remaining taxable income.

Enter the words *taxable income* into J38 and a dollar amount such as \$20,000 into L38 for your taxable income. Enter *on the first* into J39, and *on the remaining* into J40. M39 contains *tax is* and M40 contains *tax at*. I will not repeat my earlier discussion of the IF command but merely concentrate on the new function of the description. The following is also a good example of nesting IF commands with other commands. The formulas can now be entered as follows:

L39 @IF(L38<0.0,@VLOOKUP(L38,J26...M36,3))

The argument, L38, is the amount of taxable income to determine the amount of taxes and the tax rate. We have entered the range of the lookup table previously from the tax return, therefore the range of the table is known. Ensure you exclude all headings in this step. The top left is J26 and the bottom right is M36. This table will be used in all the following formulas.

As we require the first amount on which taxes are paid, we need the offset value in the fourth column. However, Symphony starts counting with zero, so we use an offset of three, that is, 0, 1, 2, 3.

L40 @IF(L38<0.0,(+L38-L39))

Here we calculate the remainder of your taxable income.

N40 @IF(L38<0.0,@VLOOKUP(L38,J26...M36,1))

The argument is L38, the amount of taxable income as above. The range of the lookup table is also as it was previously. As for the offset, this time we require the tax rate, in percentages, to be used for calculation of taxes. These figures were entered in the second column, so the offset is one.

O39 @IF(L38<0.0,@VLOOKUP(L38,J26...M36,2))

The argument is the same as it was above, as is the range of the lookup table. The offset is the portion of the table where the predetermined flat amount taxes were entered. The third column, or an offset of two,

- O40 N40*L40

simply multiplies the tax percentage by the remaining amount

O42 +O39+O40

This addition provides the total of your federal income tax on taxable income.

To check your work compare your answers to table two.

By entering and understanding these two examples you should be able to further unlock the power of your spreadsheet, especially LOTUS 1-2-3 and Symphony.

Table Two

These are what the results of the sample sheet should look like.

TAXABLE IN-				
COME (L38)	\$10,000	\$20,000	\$30,000	\$40,000
FIRST (L39)	7,074	16,506	21,222	33,012
REMAINING				
(L40)	2,926	3,494	8,778	6,988
TAX IS (O39)	1,085	2,924	4,009	6,956
TAX AT (N40)	19%	23%	25%	30%
TAX AMOUNT				
(O40)	555.94	803.62	2,194.50	2,096.54
TOTAL TAX				
(O42)	\$ 1,640.94	\$ 3,727.62	\$ 6,203.50	\$ 9,052.40

Lotus

[illegible]

```

MB: (C2) 2000                                SHEET
ZDDDDDDDDJDDDDDDDDKDDDDDDDDLDDDDDDDDMMDDDDDDDDNDDDDDDDDQDDDDDDDPD-DDDDDDDDGDDDD?
1                                                    J
2                                                    3
3                                                    3
4                                                    3
5                                                    3
6                                                    J
7
8          EXAMPLE 1A
9      Total Taxes Payable                $2,000.00        3
10     Total Tax Credits                 $2,400.00         3
11                                     -----            3
12                                     ($400.00)           3
13                                     -----            3
14 Refund:    $400.00 Bal. Due:             NA              3
15                                                    3
16 NOTE:                                       3
17 The form states that a difference of less than $1.00 is neither 3
18                                                    3
19                                                    3
20                                                    3
21 TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTEXAMPLE 1>
21-Oct-85 12:47 AM                      OnLine                      Cap

```

[illegible]

```

M6: 'EXAMPLE 1B' SHEET
ZDDDDDDDDJDDDDDDDDKDDDDDDDDLDDDDDDDDMDDDDDDDNDDDDDDDDO
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
EXAMPLE 1B
Total Taxes Payable $2,399.01
Total Tax Credits $2,400.00
($0.99)
Refund: NA Bal. Due: NA
NOTE:
The form states that a difference of less than $1.00 is neither
EXAMPLE 1
21-Oct-85 12:47 AM OnLine Cap

```

[illegible]

```

08- (C2) 2400.01                                SHEET
ZDDDDDDDDJDDDDDDDDDKDDDDDDDDLDDDDDDDDDMDDDDDDDNDDDDDDQDDDDDDQDDDDDD?
1
2
3
4
5
6
7
8      EXAMPLE 1C
9      Total Taxes Payable                $2,400.01
10     Total Tax Credits                  $2,400.00
11                                     -----
12                                    $0.01
13                                     -----
14 Refund:           NA    Bal. Due:       NA
15
16 NOTE:
17 The form states that a difference of less than $1.00 is neither
18
19
20 T*****EXAMPLE 1
   Oct-85   12:48 AM        Online              Cap

```

[illegible]

```

M6: 'EXAMPLE ID                                     SHEET
ZDDDDDDDDJDDDDDDDKD-DDDDDDL-D-0DDDDDDDDPMDDDDDDND-DDDDDDQDDDDDDDF-DDDDDDDDQDDDD
1
2
3
4
5
6
7          EXAMPLE ID
8 Total Taxes Payable                                $3,000.00
9 Total Tax Credits                                 $2,400.00
10                                                    -----
11                                                    $600.00
12                                                    -----
13 Refund:             NA      Bal. Due:            $600.00
14
15
16 NOTE:
17 The form states that a difference of less than $1.00 is neither
18
19
20
21-TIME-----XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXEXAMPLE 1
21-Oct-85   12:45 AM              Online               C

```

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Blues and Roses

MS-DOS is a really complex operating system . . . and it's full of tricks. Here's a collection of some of the most productive ones.

by Steve Rimmer

If you've ever checked out a computer running CP/M, you'll realize just how powerful DOS two is. I really love CP/M... it's sort of malleable and fast and all... but DOS has so many things you can do with it once you get into its peculiarities.

There is nothing of any great merit that DOS can do that lesser operating systems can't. However, DOS does them with worlds more convenience and flexibility. Once you set up MS-DOS to handle things the way you like them you can have your working environment behave exactly the way you want it to.

In this feature we're going to look at some of the more useful tricks one can play on MS-DOS... and the computers that run it... to get them tractable.

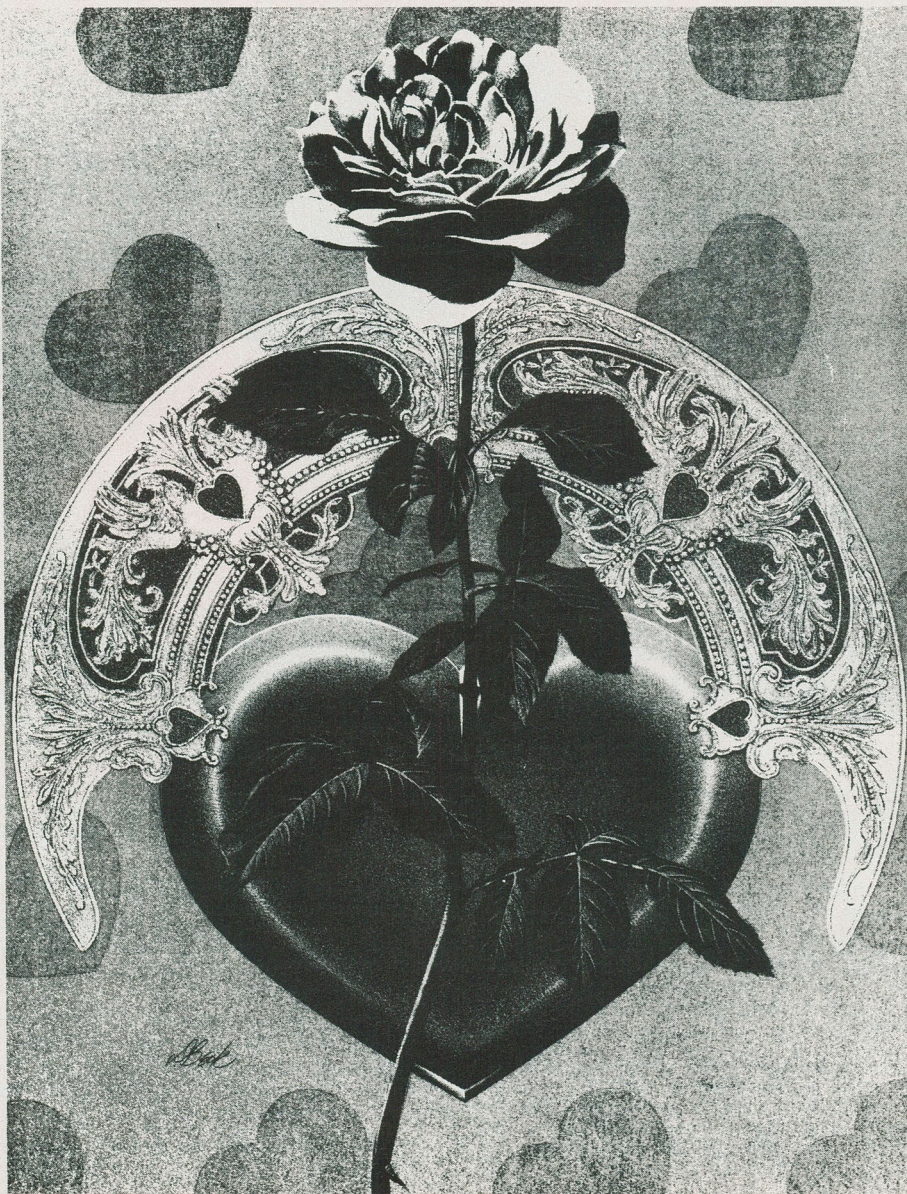
No Waiting

The first thing that any PC will want you to do when you first turn it on is to wait while it checks out its memory. The original IBM PC had sixty-four kilobytes of memory... a useless bit of RAM, to be sure.. and, as such, one imagines that this pause was tolerable. My computer has half a meg... the wait is interminable.

There are two ways around this little annoyance. The first is one which most compatible computers offer you but which few people know about. If your system runs with a Phoenix BIOS you'll find that you can abort the memory test by hitting the control and the break key simultaneously. Some versions will settle for the control key alone.

The other approach, which works with all PC compatible computers, is to set the memory switches back to sixty-four K. This means setting switches three and four in switch block one off, switches one through five in switch block two on, and six through eight in switch block two off. One can then override the switch settings after the system boots by running a program called MORERAM, available on our Almost Free PC Software disk volume five. It's convenient to stash this program in the system's AUTOEXEC.BAT file so it will run every time the computer comes up.

The first approach is preferable if your hardware will let you get away with it, as it means that you can let the RAM test run if you want to. If you use the second trip and you have a floppy based computer you'll

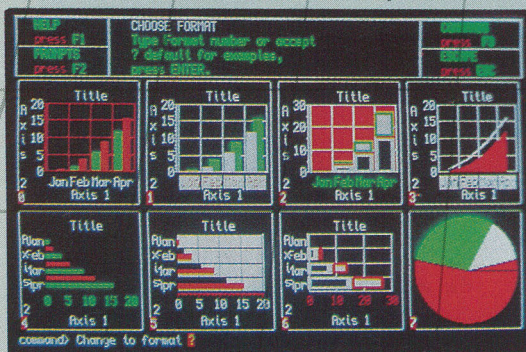


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need to put MORERAM on every bootable disk you have.

You've probably realized by now that the COPY command can do more than copy files. It is, in fact, a good example of what the computer heads call *generalized I/O*, which means that some of the system's hardware can be regarded by COPY as files would be.

A very simple example of this is in creating small text files with COPY and MS-DOS's line editor. Type

COPY CON: AUTOEXEC.BAT

and whatever you subsequently type will be echoed to the screen but copied into the newly created file AUTOEXEC.BAT... it will wipe out any previous AUTOEXEC.BATs you happen to have kicking around, so if you're in the root directory of your system you might want to pick another name to try.

You can type as many lines of text as you want to. When you're done, type a control Z and hit return. The text will be written to the file.

You can use COPY to send files out to your printer. Type

COPY WOMBAT.DOC LPT1:

and, assuming that there really is a file called WOMBAT.DOC on your disk, it will get printed.

There are a number of secondary arguments that one can give COPY. Tack a /V after whatever you tell it to do and it will verify that it all got done properly. Normally COPY doesn't do this. You can force it to verify everything it copies, if you like, by switching the verify mode flag on. Type

VERIFY ON

before you copy anything. Better still, put this line in your AUTOEXEC.BAT file.

The secondary argument /A will make COPY copy everything until it sees an EOF character in your file. It's used with ASCII files, and can make the copied files a bit shorter than the originals by stripping out dummy characters at the end of text files. It's absolutely fatal to anything besides a text file, though, as EOFs often occur as part of a program file, and will, as such, cause COPY to ignore part of the program.

The third secondary argument, /B, is used when one is copying programs... and, in fact, isn't really needed, as COPY defaults to its being on.

The COPY command can merge two files together. If you type:

COPY DOG+CAT DOGNCAT

the two smaller files will be concatenated into one larger one. In this case, the /A secondary argument is used by COPY even if you don't type it, so that there won't be any of those dummy characters between the two



files. If, for some reason, you didn't want COPY to waste everything after the EOFs, you would use the /B argument.

Drunk Drives

Quite often one will come up with a program which is "hard wired" to look for something on a drive where one is incapable of putting it. For example, you may want to have Lotus look for a spreadsheet on your hard drive, drive C, when it wants to suck in data from a... perhaps nonexistent... second floppy, drive B.

The ASSIGN command is designed to cool out some of these problems. It works pretty well about half the time. If you were to type:

ASSIGN B=C

any software which tells DOS it wants to access drive B would be fooled into thinking that it was actually doing so, even though it would really be seeing drive C.

If you use batch files to handle complex sequences of commands, you'll probably have noticed that you can hit control break to stop one once it's gotten going. However, under normal circumstances DOS only checks to see if there's a control break pending when it goes to execute a new command. If one of the programs in the batch files runs for several minutes you'll have rather a long wait if you decide to kill it.

If you put the line

BREAK ON

at the beginning of your batch file DOS will check for breaks every time the program does any I/O though DOS. In most cases

this means that a request for a break will be checked out by DOS within a couple of seconds at the most. You should turn the break off at the end of the batch file, as its being on does slow one's programs down a little.

There are a number of secondary arguments for the FORMAT command that rarely get used. Most of the time this is because they're rarely wanted. However, some of them can be handy to have.

If you tack a /8 on after all the other stuff you want to tell FORMAT the disk getting cleaned will be formatted for eight sectors to the track, as opposed to the nine that one normally encounters in DOS 2.0 disks. This will allow it to be read by a system running DOS 1.0. The /S argument is probably a bit more familiar... it'll add a system to your newly formatted disk, obviating the need for the SYS command after one is done formatting a disk. This gives you a bootable disk, but it eats about forty kilobytes of disk space. Finally, /1 will format only one side of the disk... which is handy if you only have single sided disks around and don't want to take a chance on the back side.

One of the DOS commands that's rarely used is PATH, which is a drag, as it allows one to save a lot of disk space, especially on a hard drive. On my hard drive system I've got a subdirectory called SLOTHS and the command

PATH C: SLOTHS

The SLOTHS subdirectory contains all the programs that I might want to use in other subdirectories. These include things like GWBASIC.EXE, D.COM, VFILER.COM,

Blues

DEBUG.COM and so on. If I'm in another subdirectory and try to run one of these things DOS, upon finding that it isn't there, will check out SLOTHS before it tells me to take a hike. If the command is actually in SLOTHS it will run as if it had been in the current directory.

This won't work, by the way, with programs like WordStar, which have overlays. WordStar will expect to find its overlays in the current subdirectory, not the one in which PATH finds it. If it doesn't find them there it will check out drive A for them... and probably throw a "drive not ready on A" error if there's no disk in A.

In the case of programs with overlays, I usually create little mover files to get me to where they are. For example, I have a program called OP.EXE in my root directory which handles telephone numbers. It was in the November 1985 edition of Computing Now!. It wants its number file NUMBERS.###, to be in the current directory, so it won't run under a path. As such, aside from OP.EXE in the root I also have OP.BAT in the SLOTHS directory. It contains

CD
OP

If I try to run OP from SLOTHS it will run normally, as DOS looks for EXE programs before it checks its path or looks for BAT files. If I'm in another directory the PATH will see OP.BAT in SLOTHS and execute it. It will flip me up to where the OP.EXE program is and run it. This isn't quite as convenient as having OP.EXE at the end of the path, as it will leave me in the wrong directory.

Sneaking Through the Ports

Just like software which is hardwired for specific disk drives, one frequently encounters software which insists on printing to a printer port where one has no printer. This is often the case if one has a serial printer and software which wants to write to the parallel printer port.

There is an easy fix for this. Add this command to your AUTOEXEC.BAT file.

MODE LPT1: = COM1:

or, if you want to be even more efficient

MODE LPT1:=COM1:1200.E,8,N,P

which will set up the protocol on the serial port at the same time. The final P tells DOS that the thing on the end of the serial port cable is a printer rather than a modem, so that it won't throw time out errors if the printer goes into a holding pattern for a few seconds.

This, of course, wants to see MODE.COM in the root directory. If you have it stashed out of the way in a subdirectory... like SLOTHS... and have a path into it make sure you put the mode assignment

line in the AUTOEXEC file *after* the PATH instruction.

After a while one's AUTOEXEC file starts looking a bit full, and upon booting one's computer one is greeted by a whole mass of commands happening. There are a number of things you can do if this offends you. The first is simply to put the line

ECHO OFF

at the beginning of the file. This will stop DOS from showing you the command lines it's processing until the ECHO is turned back on or until the file ends of its own accord. You can, however, have messages you do want to see show up on the screen by using the ECHO command to show them, as in

ECHO Go for lunch... this is a long file.

Turning off the echo will inhibit the display of command lines, but not of anything that any of the programs run by your AUTOEXEC file feel like printing to the tube. To get rid of these too you can replace the ECHO OFF line with the highly serious

CTTY NUL

This little pole cat redirects all of your console I/O to a nonexistent device, which means that absolutely nothing will turn up on your screen. This is fine, so long as you remember to put a

CTTY CON

at the other end of your file to turn everything back on again. If you don't do this, upon the termination of the batch file your computer will be well and truly hung, as you won't be able to type anything or see what's happening.

One final useful trick is to create a marker at the end of a long batch file to tell you when it's finished. I put these things at the end of files that compile or assemble programs. Sometimes these things will go for four or five minutes. It's good to be able to go off and do something else but to have the computer ring a bell when the whole party's over. If one places the line

REM ^G^G^G

as the last line in the file the speaker will beep three times just before the batch file terminates. Those are control Gs... bell characters... after the REM. To get them you would either hit the control G key... if you're creating the batch file using the COPY command... or hit control PG if you're using WordStar.

This thing will still beep if it's encountered when the ECHO is off. It will not, however, if you have the console redirected to NUL with CTTY when it executes. If this happens it will beep into the Twilight Zone, and naught will be heard.

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MacHacking

Making changes to the working environment your Macintosh presents to you is anything but a sport for computer hackers. These accessories will let you... painlessly... customize your Mac for whatever you do with it.

by Steve Rimmer



It's pretty hard to look at an IBM PC and see much of a personality in it. It does its thing well enough... crunching its numbers like a contented cow and slinging cryptic system messages at its chunky, character oriented screen. It has no life, though... the only mice that one finds in a stock PC are the ones that got by the cats at the warehouse.

The Macintosh is clearly beyond this. Not only does it have a really extroverted, bubbling personality and fairly opinionated headspace... it's also specifically designed to be adaptable to one's own place in the cosmic order of things. You can taste a bit of this if you play with some of the backwater options that Apple provides with the system... the control panel, for example... but, if you can step one pod beyond these, and get yourself into a few of the lesser

known resources of the system, you can magnify its power as a working environment enormously and make it into a really funky place to live.

Alternately, you can transmute it into a very serious place to work. The whole power of these little known tools is in their capacity for making the Macintosh into what you want it to be.

There is quite a lot of interesting paraphernalia to run on your Mac that doesn't come from the software distributors for sixty-nine ninety-five and up. Some of it's just public domain... a lot is underground and mysterious. It's deceptively easy to use, enormous fun and will probably blow your socks clear off when you realize the monstrous control it gives you over your system.

We're going to look at a couple of the

things you can do to your Mac that they don't tell you about in the manuals. Far from being grotty and meant only for bug eyed computer freaks, these enhancements are available to anyone who wants to use them. They'll make your system a better tool... and, if you're a bit imaginative, your disks just a little unique.

Out DAM Spot

We're going to look at two specific areas of MacHacking. The first of these is easily the least involved, and will make your system the most genuinely useful. The second is more for the fun of it than anything else. To get things going, let's have a look at the menu that nobody uses after the first week, the desk accessories.

The desk accessory menu can be accessed by clicking the little black apple in the upper left hand corner of the screen. As this menu comes in a standard finder, the stuff you can do with it is about as exciting as an evangelist on Valium. There's the puzzle... yawn... the control panel... double yawn... the key caps... quadruple yawn and a mild coma... and several other toys too dull to get into.

It is possible to change this menu quite radically. You can, to begin with, slice out some or all of the desk accessories to reclaim their disk space. This is actually a worthwhile undertaking if you never use them. Having snuffed off the losers, however, you can install new accessories which are more in keeping with your needs.

You may have noticed the absence of a menu item that reads "rip out boring desk accessories". This isn't surprising, actually. While the designers of the Macintosh quite clearly intended for the desk accessories to be replaceable... there are special hooks in the operating system to make this happen... they neglected to provide an application to allow for their realization.

There is, as it turns out, a program to handle desk accessory manipulation in the public domain. It's called DAM... you can find it, among other places, in the second volume of our almost free Mac software, as seen in this very magazine. DAM lets you delete your existing accessories, save them as files and, most important, install some of the new and highly neat accessories that are available... also in the public domain.

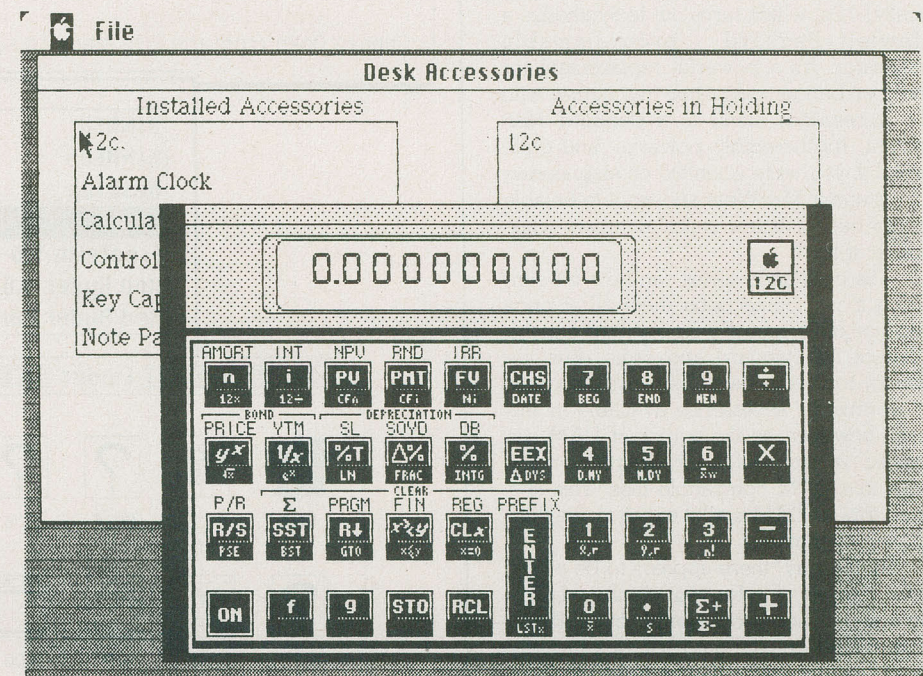
It's worth mentioning, by the way, that both DAM and some of the accessories that it moves are offered as "honourware". There's a message to make you feel guilty enough to send the authors of these things some cash if you like the code. Quite a lot of honourware is suitable only for reformatting but, I think, the desk accessories are genuinely useful. In addition, the money they entail... if you want to be honourable about it... is pretty small.

The future of your karma probably demands that you put a crowbar in your

wallet and send them some bucks if you get into this stuff.

Using DAM is fairly simple. It stores desk accessories in files that look a bit like font files. You can inhale the ones you want into DAM and move them into the system with the appropriate rat action. While this sounds just a bit technological, in the tradition of the Mac it's all menu driven with icons littered about. There's very little more to it than deciding which accessories you'd like to have on your particular desk and selecting them from DAM's menu.

You're probably just itching to know what sorts of accessories you can have.



There are quite a few and, I expect, by the time you read this there will probably be several more. We've included some of the better ones in the second volume of almost free Mac software. Bulletin boards which support Macintosh programs for downloading usually have a few too.

The first desk accessory I tried was called Uriah... obviously either a Biblical reference or a rock band, depending on how far back you want to go. It produces a graphics display of the Mac's memory heap area. This isn't really all that useful unless you're actually programming the thing... and usually not even then.

More productive accessories followed. Mockterm is a terminal program that lives as an accessory. Once installed in the menu you can pull it down and enter into heavy telecommunications even if you're in the middle of MacWrite or any other serious application. This does presume that you have a modem attached to the communications port of your Mac... there's a version which

allows for the modem to be on your printer port instead, allowing that you haven't got a printer there too.

There are a number of things that this terminal can be used for. If you like to call bulletin boards... but find them frequently busy... you can go about something else and just pull the Mockterm down from the accessories menu from time to time to see what's happening on line. This is decidedly easier than getting out of an application, booting Red Ryder or some other massive terminal program, calling a board and then going through the whole ordeal in reverse if there's no life at the far end of the line.

Business users will find Mockterm to be useful for calling Compuserve, the Source, InfoGlobe, BRS and any of a number of other powerful business data bases for much the same reasons. You can be working on something, want to check out a remote system and simply go for it. Mockterm is also useful for calling on line mainframe computers.

By the way, there's a small application available which sets the baud rate for the terminal. It's a good thing to have.... you only have to use it the first time you install the thing and if you want to alter the settings in the later dusts of ages.

One of the best desk accessories, or, rather, collections of accessories that I've come across is "Extras". It does quite a number of things for one... what must be born in mind is that it does them even if you're in the midst of running another program. When you select the extras line from the accessories menu a new menu bar will show up at the top of the Mac's screen. If you pull this down you'll be able to check out a number of options.

Among the things that Extras lets you do is to delete files from within an application... even if the application doesn't provide for this feature. Thus, for example, you can snuff off the scrap on your disks when MacPaint tells you that the thing is full and it's about to send your files into the cosmic void. You can also see how much memory you have available to an application... handy if you're wondering why you're getting system errors, for example... and force a garbage collection to free up memory which might have been left in a state of confusion by previous applications.

There's also an accessory called, cryptically, 12c, which turns out to synthesize a Hewlett-Packard programmable calculator. It's a powerful replacement for the four banger calculator that comes with the accessories menu in a standard Mac system. It's incredibly powerful, and quite useful if you write scientific or engineering things under MacWrite and want to be able to nip out for a few quick numbers while you're at it.

The desk accessories can be a bit confusing if you come upon them all at once because quite recently Apple introduced a different file standard and some desk accessory tools of its own. There are a number of worthwhile accessories available in this form, however, so the author of DAM has created a conversion program to make them into DAM compatible files. This is a good trip, as DAM is a lot easier to use than Apple's own mover.

By the way, there appears to be a limit to the number of bytes your combined allotment of desk accessories can occupy. If you exceed this, the offending accessory simply won't function, and will shortly vanish from your menu.

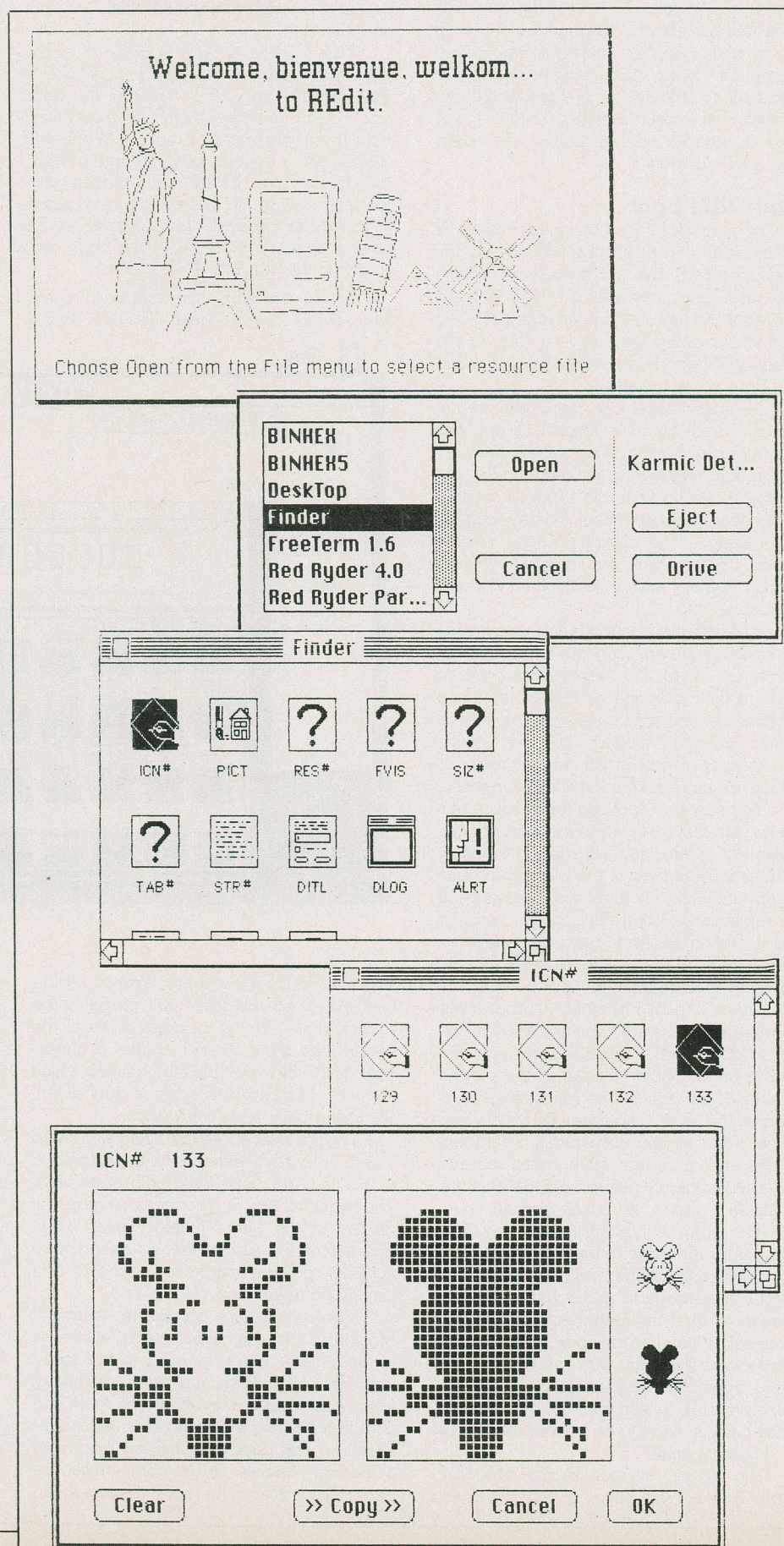
The Evil That Men Do

Having made your Mac more powerful, you might want to make it more funky. There are two programs which will allow you to alter the general working environment of your Mac. Called *resource editors*, these applications allow you to get inside the system files and raise hell.

There are two resource editors available, one called REdit, which was developed by Apple itself, and one called Resedit, which is a public domain effort by an independent human being. The latter is a bit friendlier, while the former is a great deal more powerful... although life within its tender grasp is brutish and short for the unwary.

REdit can be found on the second volume of almost free Mac software, while Resedit is on the first.

Complete domination over either of these packages requires intimate knowledge of the workings of the Mac's guts to a degree that can only be obtained by either having your spirit inhabit the body of one of



A sample session with REdit, adjusting one of the Finder Icons.

its designers or by sitting in a nice comfortable chair for a year and some with Inside Macintosh, the exhaustive software developers' handbook. However, there are a number of things that one can do to the Mac using these tools that require no real background at all. You'll need nothing more than your imagination, a mouse and a spark of pure evil.

While we'll be looking at the resource editors in more detail in another edition of Computing Now!, for the moment let us ponder the wickedness of icons. The icons in the Mac are actually bit maps and, when a program gets associated with one what it really gets is a pointer into a stack of the things. Furthermore, the icons all fall into defined groups and, as such, one can predict how many bits they'll use. This all being the case, icons can be edited.

An icon proper consists of two aspects. There's the bit pattern which you see and something called the mask. If you look at the frightened mouse icon I've used here, the icon is in the left box and the mask is on the right. The mask is the hole which the Mac cuts out of whatever the icon is to be shown in front of before laying down the icon itself.

The REdit program is handy because, as the mask is generally a silhouette of the icon itself, it allows you to copy the left box into the right box to give you something to start with in creating the mask.

While we tend to regard the Mac's system files as being part of the computer, they are in fact files in much the same way as MacWrite or MacPaint. As such, the screen icons we are used to seeing are actually associated with these files... the system, the finder and the desktop.

You may not have seen a file called the desktop. It exists, but it's marked in the directory as being invisible. If you get into either resource editor, however, you'll see it turn up in the file selection boxes and you'll be able to access it if you want to change something in it.

Finding the icons you want to mutate will take some exploring... because the documentation for this sort of thing is limited to the point of non-existence, you are going to have to do a lot of exploring at first. However, if you're even a little bit curious about what goes on inside the Mac you'll probably find it to be quite an odyssey.

I've included a sample session with REdit here to give you an idea of what's happening.

One final consideration about both of these resource editors is that neither of them features the bomb proofing that most Mac applications have. In fact, it's probably fair to say that they're pretty volatile when they're working. Not only is it easy to crash them, but they can also fry the system files on your disk if you aren't careful. Make sure that you only play with them on a backed up disk that you aren't going to freak over losing.

Eject

There are those who would maintain that the Macintosh is a complete cosmic egg... it's perfect as it stands, and the only remaining thing to do with it is to use it. Adventureless souls... everything can be made better. That's what they make chainsaws for.

Actually, considering how much the Mac is intended to be a closed, end user system it's amazing how much of it you can adapt to your own twisted purposes... with the right tools. We'll be checking out some of the tools in upcoming editions of Computing Now!

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Profile: Incorporations Unlimited

It's probably not surprising that lawyers can be assisted by computers. However, in some of the less demanding areas of law they can actually be replaced.

by Ron Harris



William McGhee is not a young man. With his graying beard and small frame, he hardly looks like someone who would be prepared to fight for years for the right of the computer to do routine work that lawyers have traditionally handled.

His company, Incorporations Unlimited Limited, provides a cheap complete incorporation service for standard straight forward company registration, provincially, federally, in any one of fifty American states or offshore. It also prepares required minute books, handles trademark registration and creates standard partnership agreements.

If all that is needed is a simple corporation with very broad objectives and all that is involved is a simple share structure, Incorporations Unlimited's package will suit about ninety-seven percent of most small businesses. But because McGhee is not a lawyer, he has found himself in hot water on several occasions.

Under the law, no one not recognized by the Law Society as qualified to give legal advice may do so. Even McGhee admits that it would be hard to argue that this is not wise. However, in the range of services that Incorporations Unlimited offers, there is nothing that an individual cannot do himself without the aid of a lawyer.

Nonetheless, McGhee has been taken to court three times by the Law Society

while he has worked to get the bugs out of the technicalities of his service and clarify what he may and may not do.

Computers and the Law

The last legal action against McGhee ended two years ago. On this occasion the Law Society hired a private investigator and had him present all kinds of problems to McGhee during an incorporation. McGhee inadvertently gave advice on filling out the forms and explained something about the way the process worked.

"This case was used to show that I was exercising legal expertise," explains McGhee. "But while I lost the court case and the Supreme Court in Ontario refused to hear an appeal, I also established that the way I use a microcomputer was not violating the realm of lawyers' legal advice. You might say that I lost the battle but won the war."

So far this view has not been challenged. But to strengthen his "political position," McGhee has also indicated in writing to the Law Society that if he is brought to court for a fourth time, he will make his programs freely available to anyone who wants them, allowing for thousands of moonlighters to make a few extra dollars on the side handling incorporations.

McGhee may now be on a solid road to some respectability for his service. "I have

about a dozen lawyers using me for routine incorporations as well as over fifty chartered accountants," he says. "They know they get proper documentation error free from me and they can charge their standard fees. They make more from incorporating each company than I do without having to do anything."

McGhee says that in some ways he prefers to deal with lawyers and accountants as they never have any questions concerning incorporation, questions that he is not allowed to answer. Nevertheless businessmen still make up the bulk of his clientele.

Whenever anyone does have questions, he refers them to a lawyer, explaining his situation. But his series of pamphlets and booklets, all written by lawyers, explain everything people generally would want to know.

The Computer Loophole

These legal battles have clearly established that McGhee cannot offer legal advice in any way to individual clients. He was also taken to court for teaching how to incorporate various types of companies at the Skills Exchange but he won this. You don't have to be a lawyer to teach law. But as long as his microcomputer is making all the "decisions" based on programs that have been created with the assistance of lawyers,

Profile

he is not giving legal advice. The computer is operating "on instructions" from lawyers.

The way the system works is that someone wanting to start a limited or incorporated company fills out simple forms with basic required information. This will include names and addresses of the directors and officers of the corporation, the shareholders' names and addresses and other related information. These data sheets are so simple that, if you wanted to, you could call McGhee and provide the information over the phone. All the forms used have been prepared by lawyers so that legally they are complete.

The data from the forms is typed into the computer, answering prompt questions as they are displayed on the screen. The program then prints out the data and the entries are double checked against the original for typographical errors. Once the information is verified as correct, it is stored on a floppy disk and the program does the rest automatically.

In a little less than a hour the computer generates the Articles of Incorporation, the Minutes and Resolutions, by-laws, share certificates and a complete minute book which is not required for actual incorporation but is often necessary for financial reasons. The wording of all the documents has been prepared by lawyers and the program simply fills in the blanks and determines which articles, by-laws and resolutions are appropriate based upon the client's information.

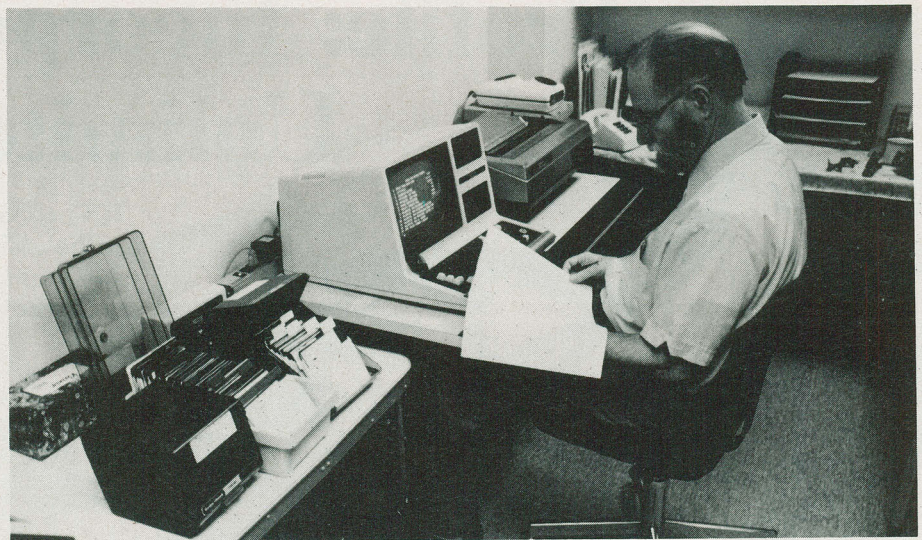
"There is absolutely no decision making by the operator," explains McGhee. "Anyone can use the program to create all these legal documents. And they are all a hundred percent error free and as professional looking as any a lawyer's office will produce."

Because there is no possibility of error apart from name and address typos, McGhee has been able to get liability insurance to the amount of a hundred thousand dollars per incorporation. He says he was able to show the insurance company that there was virtually no chance for human error. "To be quite honest," says McGhee, "There is more chance of a significant error coming from documents prepared by legal firms."

Computer Background

When McGhee began his computer service six years ago, there were no commercial off the shelf programs that allowed for variable insertions into word processing text. He required a system that would know when each article or clause was appropriate. As such, he had to program the system from scratch.

This is where his twenty-five years of experience as a computer programmer and systems analyst served him in good stead. In fact, it was this background that lead to the idea of a computerized system to do routine legal work. He found himself out of a job one day and set to work on his idea, buying



a TRS 80 Model I and working long into the nights programming and perfecting his system.

"Actually, there are a series of about a hundred sub-programs in all that I had to write in BASIC," says McGhee. "It took quite a time to build up these programs and to get the bugs out."

Once he had incorporation registration operating smoothly, he also developed similar programs to automatically prepare registration of trademarks, to form partnership agreements for unincorporated companies and to prepare yearly annual meeting reports.

Because of the way McGhee's business is completely dominated by his microcomputer, he considers his service unique. "You find ads in the classified sections of newspapers for cheap preparation of incorporation papers. Half of these people, at least in this area, probably got their start from me after I provided them with an incorporation. At one time I used to also sell incorporation kits and I have come across more than one business simply using photocopies of the forms that I had originally paid lawyers to prepare."

"But to my knowledge," continues McGhee, "While some of these businesses may use commercial word processing programs the way many lawyer's offices now do, none has fully computerized systems to handle all the work. And none provides minutes books which companies usually will need to open bank accounts."

Incorporations Unlimited is also an official NUANS, New Updated Automatic Name Search, name search firm. This means that it has access, through the computer and a modem, to the government data base in Ottawa which has all federal and provincial company names on file. Before a new incorporated company can be formed, a check must be made to ensure no one else is using that name.

Similarly, trademarks also have to be checked. McGhee does the initial search for

these over the modem and then has someone in Ottawa also consult the files personally to check actual logo designs if such are also being included in the trademark.

For standard incorporation of a new company, McGhee charges five hundred and fifty dollars. This fee includes the government charge of two hundred and twenty dollars for registration, forty dollars for the first name search, forty dollars for a corporate seal and forty dollars for a professional looking minute book.

McGhee now plans to franchise the business and work is underway to convert his programs to run on the IBM PC. He will charge around ten thousand dollars for a franchise plus ten percent royalties and shared advertising costs. All a business will need to start is a computer to run the programs on.

As far as competition is concerned, McGhee is not particularly worried. "It's taken a long fight to establish this business and to make it successful. You have to have more than a bright idea and a computer to make it work. It also takes a certain amount of dedication and a drive to ensure that you are delivering a very good service to customers."

McGhee does get a lot of repeat business. Businessmen who need a new company will often come to him again a few years down the line. Or they will refer other businessmen to him.

If someone really wanted an original business, McGhee says that the same approach could be applied to no contest divorces or to real estate. He sees no reason that computer programs could not be developed or modified to create all the necessary legal documents for these. But he says he's not interested in expanding into these areas. He would prefer to continue to make money and build up his own business as it is until he can afford to go prospecting for gold full time. He'd just as soon leave any new battles with the Law Society for others to fight.

CN!

Almost Free PC Software

Volume Five

We've ventured once more into the phone lines, scouring the public domain for the cream of its software. Distilled from several megabytes of code, this disk represents the best of what's floating around on the bulletin boards of the continent. It wasn't easy, and a lot of disks bit the dust in the process of creating this collection.

Whether you are interested in business programs, games, hardcore hacking or just making your computer a more productive tool, you'll find something of interest on this disk.

AREACODE is a useful tool if you use the telephone a lot. Give it an area code and it will tell you what city it corresponds to.

D is another sorted directory program. However, this one emulates the CP/M style D, which is arguably a lot more useful for most applications.

FRACTALS This is an amazing implementation of the Mandelbrot microscope, generating unearthly fractal images on the tube of your system. Mere words fail to describe them.

FROGGER is an implementation of the classic arcade game. Just try not to get the highway littered with frog guts.

HIDE is a package of utilities which allow you to create, enter and remove invisible DOS directories. This allows you to set up a hard drive system with areas that are only available to users that know about them.

LAR This library utility allows you to concatenate several small files into a library to save on disk overhead and then extract the individual files when you need them. It saves a lot of space when it's used with files you don't use often.

MAIL1 is a mailing label utility in BASIC.

MORERAM This is an assembler program . . . you need MASM and LINK to make it work. It lets you do a number of things to the memory settings on your motherboard, including using more than 640 K and allowing for four floppies to facilitate RAM disks. It will also allow you to set the switch settings of your motherboard for 64 K so things will boot up quicker and then change the RAM setting after booting.

MORTGAGE generates amortization charts. Read 'em and weep.

MXSET lets you control the parameters of Epson compatible printers from the command line. It's a lot easier than LPRINTing characters from BASIC every time you want to change modes.

NUSQ unsqueezes files that have been previously compressed to save space. It's primarily of use to BBS types . . . but it's extremely small.

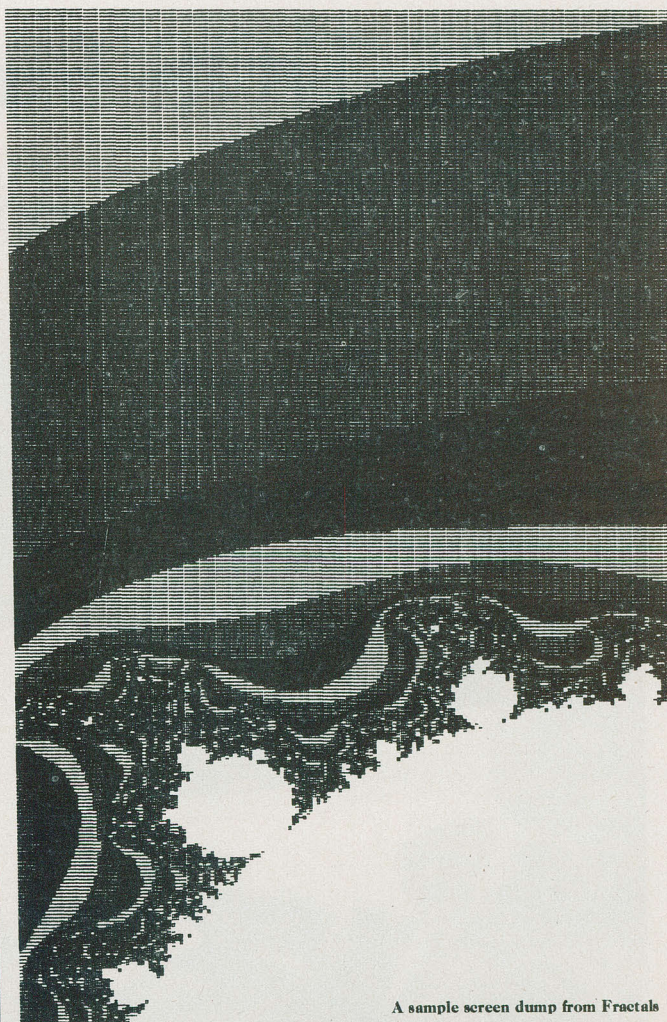
PARCHK This is an assembler program . . . you need MASM and LINK to get it going. It installs a trap for parity errors in your computer so that they don't hang your system and helps you locate where the funky RAM is.

PCBOSS This is a more user friendly working environment than is MS-DOS. It makes your whole system menu driven, with absolutely no command names to remember. If IBM were dead it would be rolling in its grave over this.

VDEL This is a delete with verify program. You could type VDEL *.ASM and it would show you the name of every .ASM file in the current directory and ask you if you want it deleted.

WHEREIS finds files in a complex hard disk system.

ZAXXONPC This is a highly decent implementation of the game. Run it and rip.



A sample screen dump from Fractals

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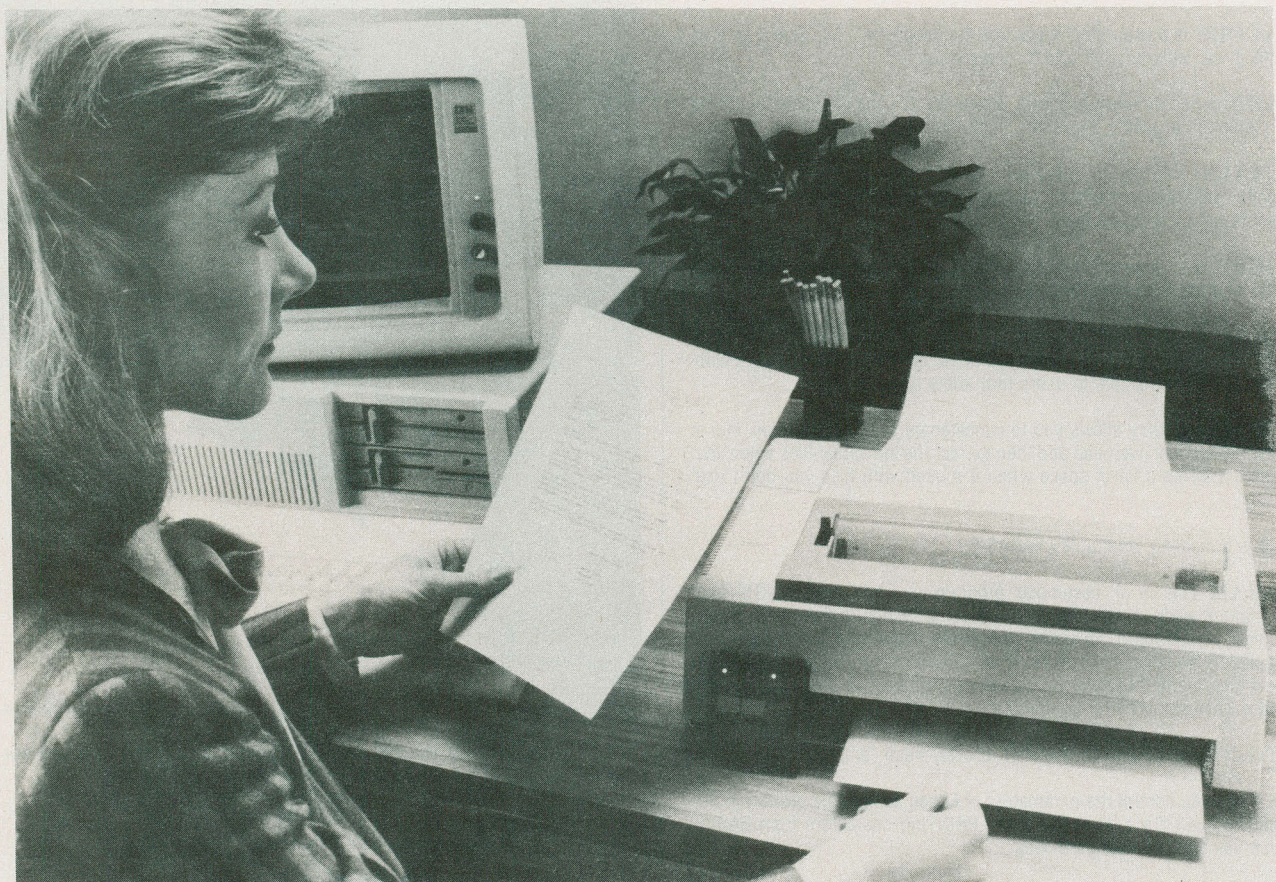
Fine Print: This software has all been collected from public bulletin boards and is believed to be in the public domain. The fee charged for it is to defray our cost in collecting it, testing it and putting this collection together, and for the cost of the media and its handling.

While we have endeavoured to make sure that this software does what it says it does, and while it has exhibited no bugs while we were using it, it is possible that some of it may not function properly on some PC compatible system. We are unable to assist you in modifying the software for your applications.

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MS-DOS Survey Update

by CN! staff



About a year ago we took a look at all the IBM PC compatibles and clones that seemed to be popping up like mushrooms. Many have since bit the dust or changed their names and moved to Argentina, but there are plenty more to take their places, and here's a quick peek at a hundred or so of them.

Since early 1983, when CN! first started doing surveys of things, the number of MS-DOS based computers has shown a steady increase. . . in fact, some people insist that it will soon be the Operating System of the World. A definite maybe on that one, but we did manage to find over a hundred of them without working up a sweat.

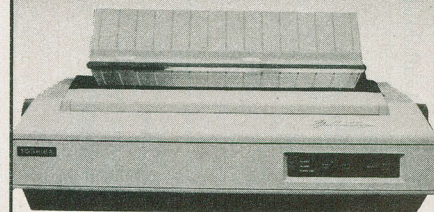
There's something for the whole family, from the big, fancy business numbers that can work in networks, to briefcase portables and even DIY kits for those handier with screwdrivers than wallets.

The machines listed here are either compatible with, or clones of the real true blue IBM PCs, XTs and ATs. The level of compatibility varies... there's a company in the States that spends a lot of its time working out compatibility ratings, but that's something we just didn't have either the time or the inclination to get into.

The information in this survey is as complete as space and time constraints would allow, but there're probably dozens of computers floating around out there that slipped through the cracks. If we missed your favourite blue machine, let us know about it, providing it's readily accessible to mere mortals who don't jet to Taiwan every other weekend to catch the sumu wrestling. Remember, too, that prices can sometimes vary from dealer to dealer, as does user support. You'll just have to check that out for yourself.

Computer	Manufacturer	RAM	Disk Drives Inc.	Display	Software Incl.	Availability	Price	Other
APC-III series	NEC	128K to 640K	one floppy	640x400, mono.	MS-DOS, GWBASIC	Zenitronics	\$2,552 list	Other config. avail. \$5272 includes 20 Mb HD; Software Library Expander board avail.
Altek PC/PC +	Altek	256K	one floppy; PC+ has two	colour opt.	op. sys.	Altek dealers	\$2,200	PC + \$2,600; monitor optional
Altek XI/DL	Altek	256K	one floppy; one HD 10Mb	monitor opt.	op. sys.	Altek dealers	\$4,800	\$6,900 for DL, with tape backup
Apricot FI	Applied Comp.	256K to 768K	one microfl. 720K	640x200, 9" mono.	MS-DOS, Starter Pack	Western Cash	\$2,800	CPM-86 optional; other configurations available
Apricot Portable	Applied Comp.	256K	two microfl.	LCD, 25x80 characters	MS-DOS, Starter Pack	Western Cash	\$4,200	
Apricot PC	Applied Comp.	256K to 768K	two microfl.	80x25 char., 9" hi-res. or 12" mono.	MS-DOS, Starter Pack	Western Cash	\$3,645	other configurations available
Best Mark II	Multiflex	256 to 640K	two floppies	monitor opt.		Exceltronic	\$1,595	7 expansion slots
Best Mark III	Multiflex	256K to 640K	two floppies	monitor opt.		Exceltronic	\$1,895	8088-2 processor
Best Mark IV	Multiflex	256K to 640K	two floppies	monitor opt.		Exceltronic	\$2,500	8086-2 processor; true 16-bit architecture
Business-Pro	Texas Inst.	512K-15Mb	1.2 Mb floppy	opt. colour or mono.		Texas Inst.	\$6,495	Winchester drives, backup tape avail. 14 expansion slots, II PC and PC AT keyboard
Canon A-200	Canon	256K	two floppies	320x200 colour, 640x200 mono.	WordStar opt.	Canon dealers	\$3,945	5 expansion slots
Cedar	ROLM	512K	two floppies	640x200 mono.; IBM compatible graphics	MS-DOS, GWBASIC, PCS (ROLM software)	ROLM	\$5,950	works with ROLM CBX system; emulates DEC VT100, or IBM 3270
Compaq 286 Portable	Compaq	256K	one floppy 1.2 Mb	9" mono. monitor, 640x200, 720x350 hi-res		Computer stores	\$7,299	Included clock, asynchronous port; model 2 adds 20 Mb HD, for \$10,199
Compaq Deskpro 286/1	Compaq	256K	one floppy 1.2 Mb	optional		Computer stores	\$9,750	
Compaq Deskpro 286/2	Compaq	512K	one floppy 1.2 Mb; one HD 30 Mb	optional		Computer stores	\$9,750	
Compaq Deskpro 286/3	Compaq	512K	one floppy 1.2 Mb; one HD 30 Mb	optional		Computer stores	\$10,899	includes 10 Mb tape backup; 20 or 70 Mb HD avail.
Compaq Deskpro model 1	Compaq	128K to 640K	one floppy	optional		Computer stores	\$3,580	models 2 to 5 avail, various floppy and hard drive config, asynchronous

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Computer	Manufacturer	RAM	Disk Drives Inc.	Display	Software Incl.	Availability	Price	Other
Compaq Plus	Compaq	128K	one floppy, one HD 10 Mb	9" mono monitor, 640x200, 720x350 hi-res	MS-DOS 2.0, BASIC 2.0, Computer stores		\$6,499	
Compaq Portable	Compaq	256K	two floppies, 5 1/4" DSDD	9" mono monitor, 640 x 200, 720x350 hi-res	MS-DOS, BASIC	Computer stores	\$4,399	
Comptech 8088 PC XT	Comptech	640K	two floppies	optional		Comptech	\$1,295	8 expansion slots
Corona 400 Portable	Corona	256K, to 512K	two floppies, 5 1/4", 360K	640x200 mono	DOS, GWBASIC, tutor	Nelson Computers	\$2,495	desktop model, \$2,995; parallel & ser. ports
DCS-570	Multitech	512K, to 640K	one floppy, one HD 10 Mb	1024x768, colour graphics	Chinese DOS, Chinese T/MAKER	Tithes	call for price	Chinese character generator included
Data General/One	Data General	128K	one micro, 3 1/2", 5 1/4" optional	640x200 mono	BIOS in ROM, MSDOS	Data General	call for price	others built-in
ECS PC/XT	Electronic Control	640K	one floppy, 5 1/4", DSDD	640x200 colour, 720x348 mono		Electronic Control	\$1,095	8 expansion slots; 8087 coprocessor optional
ET 100	Heathkit	16K	cassette-based disk drive upgrade avail.	optional		Heathkit	\$1,499	Assembled kit \$1,999
Eagle PC + 1/PC + 2	Eagle Computers	256K, to 640K	one floppy, 5 1/4"	not included	MS-DOS, BASICA	Lanpar	\$1,895	PC + 2, with two fip. \$1,995; 4 expansion slots
Eagle Spirit II	Eagle Computers	128K	two floppies, 5 1/4"	640x200 green	MS-DOS, BASICA	Lanpar	\$1,995	
Eagle Spirit XL	Eagle Computers	128K	two floppies, 5 1/4", one HD 10 Mb	640x200, green	MSDOS, BASICA	Lanpar	\$3,195	
Eagle Turbo GT	Eagle Computers	512K	one floppy, 5 1/4", one HD 32 Mb	not included	MSDOS, BASICA	Lanpar	\$4,995	
Eagle Turbo I and II	Eagle Computers	256K	one floppy, 5 1/4"	not included	MSDOS, BASICA	Lanpar	\$2,495	with two floppies; \$2,595
Eagle Turbo XL	Eagle Computers	256K	one floppy, 5 1/4", one HD 10 Mb	not included	MSDOS, BASICA	Lanpar	\$3,595	8 expansion slots
Ericsson Portable	Ericsson	256K, to 512K	one 360K floppy, 5 1/4"	plasma display, 25x80 char. with graphics	MSDOS, GWBASIC, diagnostics, tutorial	Ericsson	\$4,500	printer optional
Ericsson XT	Ericsson	256K, to 640K	one floppy 5 1/4", one HD 10 Mb	640x200 mono	MSDOS, GWBASIC, diagnostic, tutorial	Ericsson	call for price	
Executive Partner	Panasonic	256K, to 640K	two floppies, 5 1/4"	plasma display, 25x80 characters	MSDOS, MBASIC, wordproc. spreadsheet	Nelma	call for price	integrated printer incl. colour monitor opt.
Genesys	Comptech Micro Design	256K	one floppy, 5 1/4", DSDD, HD available	640x200 mono, 320x200 colour	several packages incl., no operating system	Comptech Micro	\$1,595	
H-100	Heathkit	192K	one floppy, 5 1/4", DSDD	640x255, colour optional	MS-DOS	Heathkit	\$2,999	with monitor, \$3,199
HS 148-41	Heathkit	256K	one floppy, 5 1/4", DSDD	320x200, colour	MSDOS, diagnostics	Heathkit	\$1,599	screwdriver assembly kit
HSA 9161-21/52	Heathkit	128K	one floppy, 5 1/4", DSDD	640x200 colour	MSDOS, diagnostics	Heathkit	\$2,399	\$2,599 for 52, with two floppies
IBM PC	IBM	256K, to 640K	one floppy, 5 1/4", 360K	optional		IBM dealers	\$3,249	\$3,725 for two floppies; 5 expansion slots
IBM PC/AT	IBM	256K, to 640K	one floppy, 1.2 Mb	optional		IBM dealers	\$6,499	
IBM PC/AT Enhanced	IBM	512K, to 640K	one floppy, 1.2 Mb, one HD 20 Mb	optional		IBM dealer	\$9,449	
IBM PCjr Enhanced	IBM	128K, to 512K	one floppy, 5 1/4", 360K	optional		IBM dealers	\$1,179	
IBM Portable	IBM	256K	one floppy, 5 1/4", 360K	9" amber integral screen		IBM dealers	\$3,179	\$3,669 with two floppies; 5 expansion slots
IBM XT	IBM	256K	one floppy, 5 1/4", 360K; HD optional	optional		IBM dealers	\$3,699	\$4,199 with two floppies; 8 expansion slots; \$6,349 with two floppies and 10 Mb HD

Almost Free PC Software

Volume 6

Special Two Disk Set

Five hundred years ago you could have been called a witch for having software like this.

The IBM PC public domain is one of the most lively aspects of micro computers just now. While actual paid for software companies are cheerfully flipping over and floating to the surface all around us, public domain authors seem to be everywhere. Some of them are brilliant, and some of the software that one finds out there is profound beyond mere words.

In volume six of our almost free PC software you'll come upon some of the larger applications that have been released in recent months. We've tried to get a fairly decent blend of both serious business stuff and good wholesome bloody video games. There is also some first rate code for computer hackers.

3-Demon is one of the most interesting variations on Pac-Man in the known universe. Rather than simply looking at a map of a maze, this program shows you a three dimensional view of it. You wander through endless corridors munching out on either food pellets or granola bars... your choice... and avoiding the deadly ghosts.

DU was one of the most powerful CP/M based disk utilities ever envisioned. This version for the PC captures much of its power and flexibility. It allows you to see what the tracks and sectors of your disks look like, recover erased or damaged files and meddle with the system tracks.

General Ledger This is a complete general ledger accounting package in BASIC. It's exceedingly well written and comprehensive. It'll do most of what the very expensive packages will do without laying an endless licensing agreement on you. An enormous documentation file is included.

PC-Chess is a pretty slick chess program for the PC. It features colour graphics... if you have a colour tube... and a running chess clock. While not as lively as Asteroids, chess has been around longer.

RAMDISK is the assembler source code for a memory disk program. If you've always wanted to know how these things work... or want to write some sort of variation on this useful utility... here's your chance.

VFILER is a file management utility without equal. It shows you all the files in a directory and allows you to copy them, type them, execute them, mass move them... in short, it does almost everything DOS does but it's user friendly.

QModem is unquestionably the best telecommunications package in existence. This is the most recent version of it, replete with windowing, multiple protocols, function keys and unspeakably well debugged code throughout. A modem without this software is like IBM without ties.

ARC is a very sophisticated file archiving package. It not only libraries multiple small files into one larger one, but it analyses each file and applies compression to it in the best of four ways to use up the least amount of disk space.

ZAPLOAD is a utility for programmers to handle Intel standard HEX files. It's seethingly fast and well documented.

SOPWITH lets you fly a World War One biplane around and blow up things. If you're not quick enough you may become one of the things. The graphics are superb and the carnage is no where near as bad as a moderately good news day.

JSB is another BASIC music program. You have to troll through a lot of these things to find the ones that don't make your ears fall off. This one plays a Bach sonata.

STAR is exceedingly stupid but fun to look at and very small. It draws... yes, you've guessed it... stars.

SURFACE draws the often seen and tediously reproduced "hat" function. It takes a very long time to do this, which proves that the task is very complex and thus well worth doing.

OP is the operator program we ran in the November edition of Computing Now!. It's very useful... even more so if you don't have to type in the source.



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Fine print: All of this software was obtained from public bulletin boards and is believed to be in the public domain. Some of it is freeware... its authors would like you to send them some money if you decide you like it. This is between you and your credit limit.

Please note that we aren't charging you anything for this software, but rather, for the cost of our downloading, sorting and assembling it and for the cost of the media and postage to get it to you.

We've tested this software thoroughly and it all appears to be working properly. Some of it, like the resource editor, will require a degree of expertise to use fully. Be prepared to experiment a bit. We are unable to assist you with adapting this software to your specific applications.

If you are unable to read the files on this disk contact us. We can jointly swear at the post office and we'll replace your disk.

This disk is provided without a system and will not boot. You will have to copy the files onto a bootable disk to use them.

Computer	Manufacturer	RAM	Disk Drives Inc.	Display	Software Incl.	Availability	Price	Other
Kanto	Micro Computers	256K	one floppy, 5 1/4", three more optional	colour, with IBM adapter		Micro Computers	\$1,995	two serial and one parallel ports standard
Kaypro 16	Kaypro	256K	one floppy, 5 1/4", one HD 10 Mb	colour	MITE, MS-DOS, GWBASIC, WordStar	Computron	\$4,445	
Kaypro 16-2	Kaypro	256K	two floppies	colour	MITE, MS-DOS, GWBASIC, WordStar	Computron	\$3,295	
Kaypro 2000	Kaypro	256K, to 748K	one micro fl., 3 1/2"	LCD, mono, 80x25 char.	MS-DOS	Computron	\$3,595	laptop model
Kaypro 2861	Kaypro	512K, to 640K	one floppy, high density 122 Mb	monitor not included	GWBASIC, no operating system.	Computron	\$4,795	desktop model
M-21/24	Olivetti	256K, to 640K	two floppies, 5 1/4"	640x400 mono	MS-DOS, GWBASIC	Olivetti dealers	\$4,140	M-21 portable; M-24 desktop
Molecular 16/100	Molecular Comp.	256K	one 819K floppy; one HD 10 Mb	optional		Norango	\$8,500	(was Durango Poppy I)
Molecular 16/200	Molecular Comp.	640K, to 2 Mb	one 1.2Mb floppy; one HD 20 Mb	optional		Norango	\$11,680	(was Durango Poppy II)
Molecular 16/202	Molecular Comp.	640K, to 2 Mb	one 1.2 Mb floppy; one HD 40 Mb	optional		Norango	\$13,352	internal tape optional; up to 16 users
Morrow Pivot II	Morrow	320K, to 640K	two floppies, 5 1/4", 360K	LCD, backlit, 80x25 char.	MS-DOS 2.11, telecom, SVG Marketing and WP in ROM		\$3,295	RGB card and modem optional; battery-based system; 8088 processor
NAMTEC-XT	North American	256K, to 640K	two floppies, 5 1/4", 360K	colour card inc. no monitor		North American Micro	\$1,400	8 expansion slots; #5151 professional keyboard included; Phoenix BIOS; multifunction card avail.
NCI PCXT	Nielson Computers	256K	two floppies, 360K	640x200 mono. clr. crd. incl.		Nielson Computers	\$1,695	parallel printer included; 130 Watt power supply
NCR PC6	NCR	256K, to 640K	one floppy 360K, one HD20 Mb	optional		NCR	call for price	IBM XT compatible; 8 expansion slots
NCR PC8	NCR	256K, to 512K	one floppy 1.2 Mb 5 1/4"	monitor optional	DOS	NCR	About \$7,000	
NCR PC8 Enhanced	NCR	512K, to 4 Mb	one floppy, 1.2 Mb, one HD 20 Mb	monitor optional	DOS	NCR	About \$9,799	
North Star Business series 300/1200	North Star	1 Mb	one floppy, 360K, one HD 30 Mb	640x200 mono. IBM compatible graphics	North Star NetWare	CANAMICRO	\$21,395	1200 - with 240 Mb HD, \$32,995; server for up to 50 IBM PCs
North Star Dimension series	North Star	1 Mb	one floppy 360K, one HD 15 Mb	640x200 mono. IBM compatible graphics		CANAMICRO	\$8,535	up to 12 users; worksta. with mono. monitor \$2,975
Ogivar PC	Ogivar Inc.	512K, to 640K	two floppies, 5 1/4", DSDD	video card. incl. monitor opt.		Ogivar Inc.	\$1,995	8 expan. slots; serial, para. ports standard
Olympia People	Olympia Business Machine	128K	two floppies 5 1/4"	640x475 mono.	WordStar, SuperCalc, dBASE II	Olympia Business	\$4,495	
PC 6300	AT & T	128K, to 640K	two floppies, 5 1/4"	mono. 640x400 & 640x200		AT & T dealers	call for price	colour monitor optional
PC 6300 Plus	AT & T	128K, to 640K	two floppies, 5 1/4"	graphics monitor included		AT & T dealers	call for price	
Panama XT1	Ogivar, Inc.	512K, to 640K	two floppies, 360K, or HD variation	Video card incl. no monitor		Ogivar, Inc.	\$2,985	serial and parallel ports, 12 expansion slots
Panama XT2/3	Ogivar, Inc.	512K, to 640K	one floppy, 5 1/4", one HD 10 Mb	video card incl. monitor opt.		Ogivar Inc.	\$4,685	\$4,985 for 25 Mb HD; 12 expansion slots; serial and parallel ports standard
Persona 16	Nelma	256K, to 640K	two 5 1/4" floppies, DSDD	640x200 chr. 720x350 mono.	MS-DOS	Nelma	\$2,795	other configurations available
Philips PC, P 3100	Philips Information Systems	256K, to 512K	two floppies, 5 1/4", DSDD	640x325, mono.	GWBASIC, MS-DOS, PC Tutor	Philips Information	\$3,175	full line of Philips peripherals available
Philips PC, 3100 HD	Philips Information Systems	512K	one floppy, 5 1/4", one HD 10 Mb	640x325 mono.; colour optional	GWBASIC, MS-DOS PC Tutor	Philips Information	\$4,520	full line of Philips peripherals available
Portable PC	Hewlett-Packard	372K	optional	16x80 characters, LCD	MS-DOS, Lotus 1-2-3, MemoMaker	Hewlett-Packard	\$5,158	IBM file compatible; operating system in ROM; portable drive #9114A \$1,312
Portable PLUS	Hewlett-Packard	128K, to 896K	optional	25x80 character LCD	MS-DOS, Lotus 1-2-3, MemoMaker	Hewlett-Packard	\$3,971	(see Portable)

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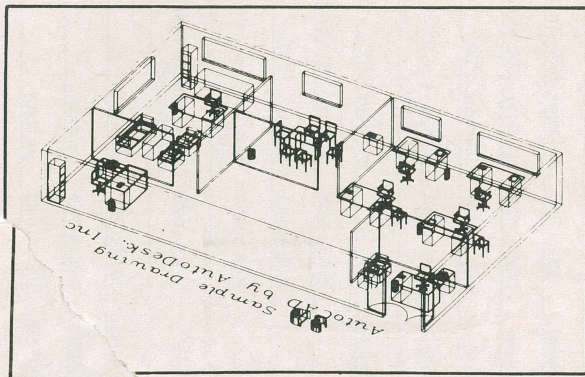
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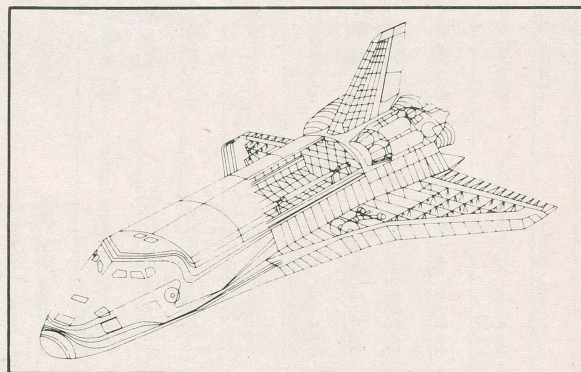
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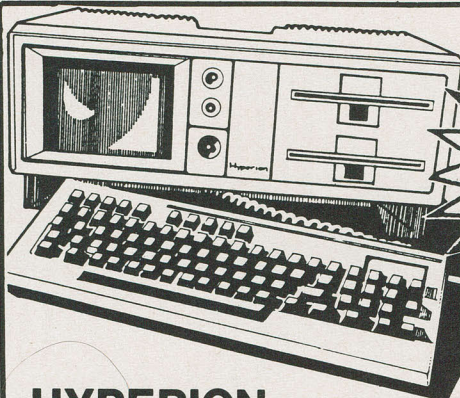


Computer	Manufacturer	RAM	Disk Drives Inc.	Display	Software Incl.	Availability	Price	Other
President	President Comp.	256K, to 640K	two floppies, 360K	720x348, mono.	MSDOS 2.1	President Computers	\$1,995	8 expansion slots; choice of colour or mono. card; keyboard AT layout
President Executive	President Comp.	640K, to 1 Mb	one floppy, 360K; one floppy 1.2 Mb	720x348, mono	MSDOS 2.1	President Computers	\$5,998	80286 processor, other configurations available
President Senior	President Comp.	256K, to 640K	one floppy, one HD 10 Mb	720x348, mono	MSDOS 2.1	President Computers	\$3,203	serial and parallel ports included; clock
Pro-Lite	Texas Instruments	256K, to 768K	one floppy, 3 1/2" micro	LCD, backlit, 640x200	MSDOS in ROM	Texas Instruments	\$4,895	PC interface cable, internal modem, 2nd fl. drive avail.
Rainbow 100/100+	Digital Equipment	128K, to 896K	dual floppy drive, 5 1/4"	800x200 mono. clr. optional		Digital Equipment	\$4,793	dual proc. 280, 8088, 100+ incl. 10Mb HD for \$7,825, MSDOS or CPM-86 choice op. sys.
STM AT	Semi-Tech Microelectronics	640K	one floppy, 1.2 Mb, any second second optional	none included	none included	Semi-Tech Micro	call for price	Phoenix BIOS; 6 or 8 Mh. disk controller card incl. other config. avail.
STM AT Enhanced	Semi-Tech Microelectronics	640K	one floppy, 1.2 Mb; one HD 26.7 Mb format	none included	none included	Semi-Tech Micro	call for price	same as STM AT; any disk config. avail.
STM PC	Semi-Tech	256K, to 512K	two floppies, 5 1/4", DSDD	LCD, 25x80 optional	Microsoft 2.11	Semi-Tech Micro	call for price	supports IBM and Hercules modes, 17 video modes; I/O bus expn. con. SCSI interface
Senior Partner	Parasonic	256K, to 640K	two floppies, 5 1/4", DSDD	9" monitor, RGB output	BASIC, MS-DOS	Parasonic dealers	call for price	portable, integrated printer 10 Mb HD kit avail.
Sharp PC 500	Sharp Electronics	128K	128K bubble cartridge floppy optional	LCD, 640x80	MSDOS, GWBASIC	Sharp Electronics	\$2,695	briefcase portable; modem, thermal printer opt.
Solution 500 PC	North American Mikrotech	256K	two floppies, 5 1/4", 360K	640x200, colour	MSDOS, PC Write, PC Calc	North American	\$2,499	5 expansion slots
Sperry PC/HT series	Sperry Corporation	256K, to 512K	one floppy, 360; HD optional	720x350 mono.	MSDOS, diagnostic	Sperry Corp.	*call for \$	6 expansion slots
Sperry PC/IT series	Sperry Corporation	512K to 1 Mb	one floppy, 1.2 MB, HP optional	640x200 colour	MSDOS 3.11 diagnostics	Sperry Corp.	*call for \$	8 expansion slots
T300/1	Toshiba	192K, to 512K	one floppy, quad. density	640x500 mono. clr. crd. incl.	MSDOS, T-BASIC 16	Genamation	\$2,995 list	6 expn. slots; serial, parallel ports standard
T300/2	Toshiba	192K, to 512K HD 10 Mb	two floppies, quad. dens.	640x500 mono. colour card incl.	MSDOS, T-BASIC 16	Genamation	\$3,995 list	6 expn. slots; serial, para. ports standard
TEO XT	TEO	256K, to 640K	two floppies, DSDD, 5 1/4"	640x300 clr. graphics monitor		TEO	\$1,285	
TI Portable	Texas Instruments	128K, to 768K	one floppy, 360K, Winchester opt.	720x300 9" clr. or mono incl.	operating systems	Texas Instruments	\$3,395	
TI Professional	Texas Instruments	128K, to 768K	one floppy, 360K; Winchester opt.	720x300 mono. colour optional	operating system	Texas Instruments	\$3,495	desktop version of TI Portable
Tandy 1000	Tandy/Radio Shack	128K to 640K	one floppy, DSDD	colour & mono cards incl.	DOS, BASIC, DeskMate	Radio Shack	\$1,599	\$3,299 with 10 Mb HD
Tandy 1200 HD	Tandy/Radio Shack	256K, to 640K	one floppy 5 1/4", DSDD, one HD 10 Mb	optional		Radio Shack	\$3,299	
Tandy 200	Tandy/Radio Shack	128K	two floppies, 5 1/4"	640x400 colour	MSDS	Radio Shack	\$2,499	\$3,890 with 10 Mb HD
Televideo 1605	Televideo	256K, to 512K	two floppies, 5 1/4", DSDD	640x200, mono.	MSDOS, Telesolution	Datamex	\$3,421	model C, colour monitor, \$4,080; model D, one floppy, one HD 10 Mb, mono. monitor, \$4,699
Televideo AT/1	Televideo	256K, to 640K	one floppy, 1.2 Mb	optional		Datamex	\$5,769	8 expansion slots; model /2 includes one HD, 44.5 Mb, \$9,477
Touchscreen II	Hewlett-Packard	256K, to 640K	two micro floppies, 3 1/2" 710K each	640x378 mono., 512x390 graphics	MSDOS 2.11	Hewlett-Packard	\$6,038	includes serial interfaces; IBM file compatible
Touchscreen Max II	Hewlett-Packard	256K, to 640K	one microfloppy, 710K, one HD 20 MB	640x378 mono., 512x390 graphics	MSDOS 2.11	Hewlett-Packard	\$9,344	includes serial interfaces; IBM file compatible
Trojan 150	Trojan Data Systems	256K, to 640K	one floppy	monitor optional		Robin Hood Computers	\$1,199	8 expansion slots; 4.77 megahertz
Trojan 250	Trojan Data Systems	256K, to 640K	one floppy	monitor optional		Robin Hood Computers	\$1,395	5 expansion slots, 8 megahertz
Trojan 286	Trojan Data Systems	256K, to 640K	one floppy	monitor optional		Robin Hood Computers	\$2,500	IBM AT compatible

*depends on configuration;

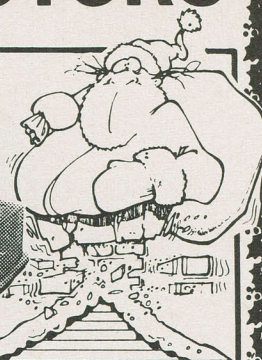
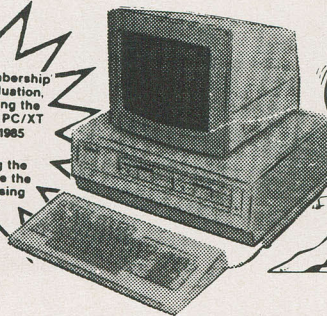
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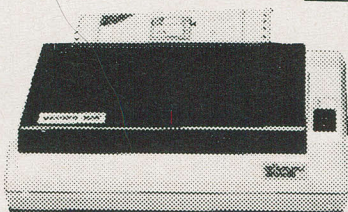
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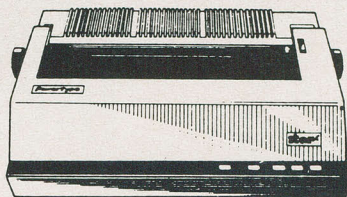
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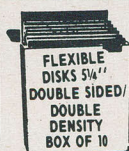
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Unitron 2904 XT	Unitron	256K	two floppies, 5 1/4", DSDD	clr. graphics card incl. no mnt.		Genitek Marketing	\$1,599	runs all IBM programs; includes serial, parallel, and games ports, clock/calendar
Vectra	Hewlett-Packard	256K, to 640K	one 1.2 Mb floppy	640x400 mono.	MS-DOS	Hewlett-Packard	\$7,406	IBM AT compatible; with 20 Mb HD \$10,154
Victor Vickie	Victor Technologies	256K	two floppies, 5 1/4"	800x400, mono		Zenitronics	\$4,792 list	
Vista PC	Datapoint	256K, to 1 Mb	one floppy, 5 1/4"; one HD 10 Mb	720x348, colour CDOS for HD	MS-DOS, GWBASIC	Datapoint Canada	\$11,000 list	
Visual Commuter	Visual Computers	256K, to 512K	two floppies, 5 1/4"	LCD, 25x80 characters	MS-DOS, GWBASIC	Nelma	\$2,995	colour monitor optional
Wang Advanced Professional Computer	Wang	512K	one floppy, 360K	optional	MS-DOS, interpretive BASIC	Wang Canada	\$5,325	\$6,130 with mono. monitor, card; 4 expan. slots
Wang Professional Computer	Wang	256K, to 640K	one floppy, 360K	optional	MS-DOS, interpretive BASIC	Wang Cards	\$3,725	\$4,530 with mono. monitor and card; 5 expan. slots; data diskette level compatible
XT Compatible	N/A	256K	one floppy, 360K, one HD 10 Mb	colour	N/A	Budgetron	\$1,650	8 expansion slots; other configurations available
Xerox 6064 Personal Comp.	Xerox	256K	two floppies, 360K, DSDD	640x400, mono.		Xerox Stores	\$4,480	optical mouse available
Xerox 6065	Xerox	256K	one floppy, 360K, DSDD, one 10 Mb HD	640x400 mono.		Xerox Stores	\$7,380	optical mouse available
ZF 158.41	Zenith					Heath/Zenith	\$3,349	assembled version of HS 158.41, Heathkit
ZF-241.81	Zenith	512K, to 15 Mb	one 1.2 Mb floppy	no monitor included	MS-DOS 3.0	Heath/Zenith	\$6,200	IBM AT compatible; 8 expansion slots
ZFA 161.21	Zenith	128K	one floppy 5 1/4", DSDD	640x200, colour	MS-DOS, diagnostics	Heathkit/Zenith	\$2,699	

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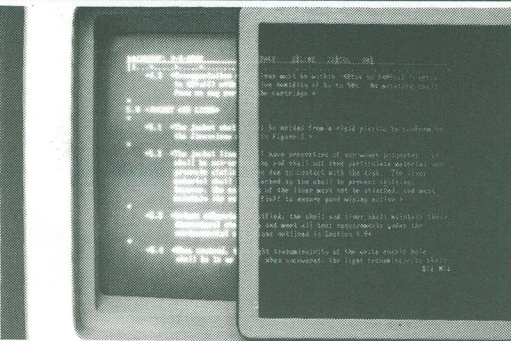
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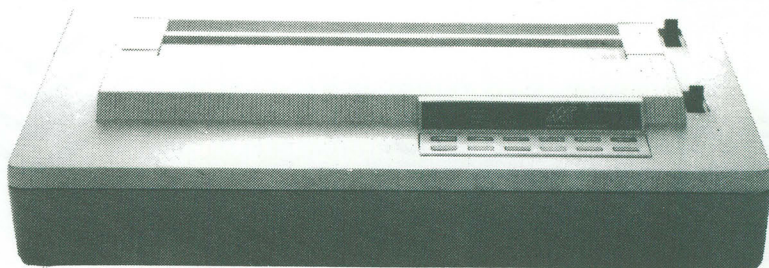
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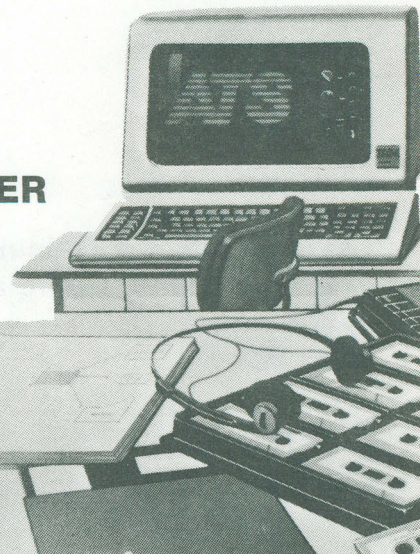
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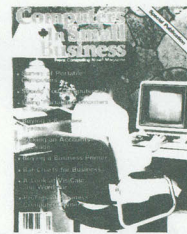
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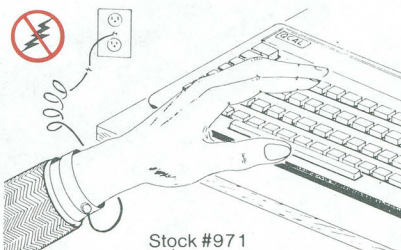
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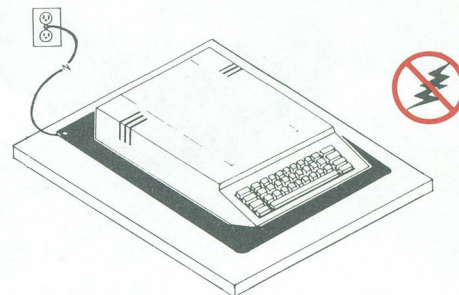
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Section



The Starplus Review

WordStar, friend of the faithful, has been the victim of a number of third party enhancements. Here's a look at one of the slickest WordStar utilities.

by Donald Roy

If you have worked with WordStar since it was the only decent word processor around using cryptic control codes is probably second nature to you. In fact, in a perverse sort of way, you may even *prefer* them... poor soul. At the time, of course, there really wasn't an alternative if you wanted to work with the program.

Now, there is a choice. In the ever increasing parade of RAM resident utilities, one can now find *Starplus*... a WordStar enhancement program. The person that said something about good things and small packages might have had this package in mind.

Miniature Menu

Intended to work with all WordStar versions to date, as well as DOS 1.1 to 2.1, this inexpensive utility adds a menu of function keys at the bottom of one's screen. If you have a later WordStar version with its own function key display, Starplus will replace that menu with its own. As well, a good number of multiple key command sequences have new alternates, to be found as single strokes on the function key pad.

A total of eleven single line menus can be called to the screen, grouped by function. These offer one touch control in areas such as help, print and block functions, as well as file, editing and onscreen manipulations. Calling the different menus assigns new meaning to most of the function keys. The use of the entire program can be toggled on and off with an *Alt =* sequence.

A group of "shift functions" is always resident, regardless of the menu currently on the screen. *Shift F1* will abandon the current edit, equivalent to the control KQ sequence in WordStar, while *shift F10* will do a file save and return you to the no file menu. If you have ever learned the sorry

lesson to back up your work often during an edit, then you will appreciate the *shift F9* command. This will do a file save and return you to the cursor position you were at before saving, equivalent to a control KS control QP sequence.

While some other RAM resident packages can be called memory hogs, Starplus' appetite is limited to about six thousand bytes. This small price buys you several additional cursor movement options, as well. In all cases, control commands that you have down pat can still be used while you reserve use of the Starplus keys for those that you still look at the manual for.

One nice touch is that hitting either a shift key or the caps lock causes the cursor to change to a full, blinking block. This does make finding the little devil easier when it's lost somewhere in a full screen of text.

Compatibility

The version of Starplus that I tried was version 1.2, which worked quite nicely with a WordStar 3.20 and PC-DOS 2.1 combination. New enhancements to the current

release include an onscreen num lock indicator and compatibility with Borland's Sidekick and Rose Soft's ProKey. The documentation for Starplus indicates that it should be loaded after other RAM utilities and just before WordStar. Without running through an exhaustive check of Sidekick functions, there appeared to be no interference between the two, except that selection from the main Sidekick menu had to be done with arrow keys... the function keys were still held by Starplus.

Clone owners may have need for an alternate EXE file on the program disk. Corona and Olivetti PCs and Tandy 2000s, not running on the standard disk speed, are known to cause problems which are cured by using the standby file.

Another thoughtful inclusion is a separate EXE file that will install that block cursor routine into memory, so that it can provide the same caps lock indicator function while working with most other programs. Any software that processes its own

keyboard interrupts, however, is not likely to get along.

The enclosed documentation, while not inspiring, is complete. A step by step tutorial is included in the twenty page work, as well as fast start instructions. Separate sheets provide the installation instructions when working with Sidekick or Prokey and a quick reference card is also included with the latest version.

Considering the numerous methods of text manipulation available from within WordStar, this accessory program does a good job of grouping functions in a logical and natural fashion. In operation, Starplus stays out of the way until you need it. This is and should be the way any utility works.

If you already have all the sequences you need memorized to make WordStar do your exact bidding, then you likely don't need Starplus. However, if you still refer to the manual once in a while, or you are teaching someone to use Micropro's package, then you might want to look at this one a little closer.

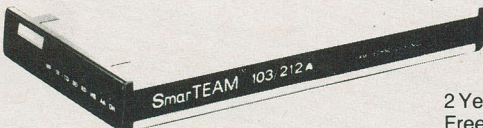
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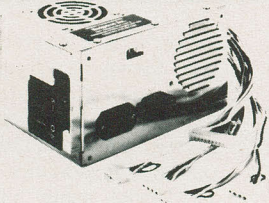
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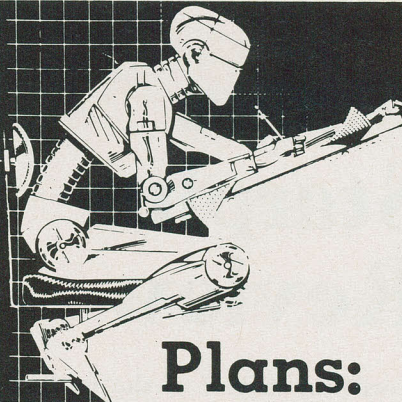


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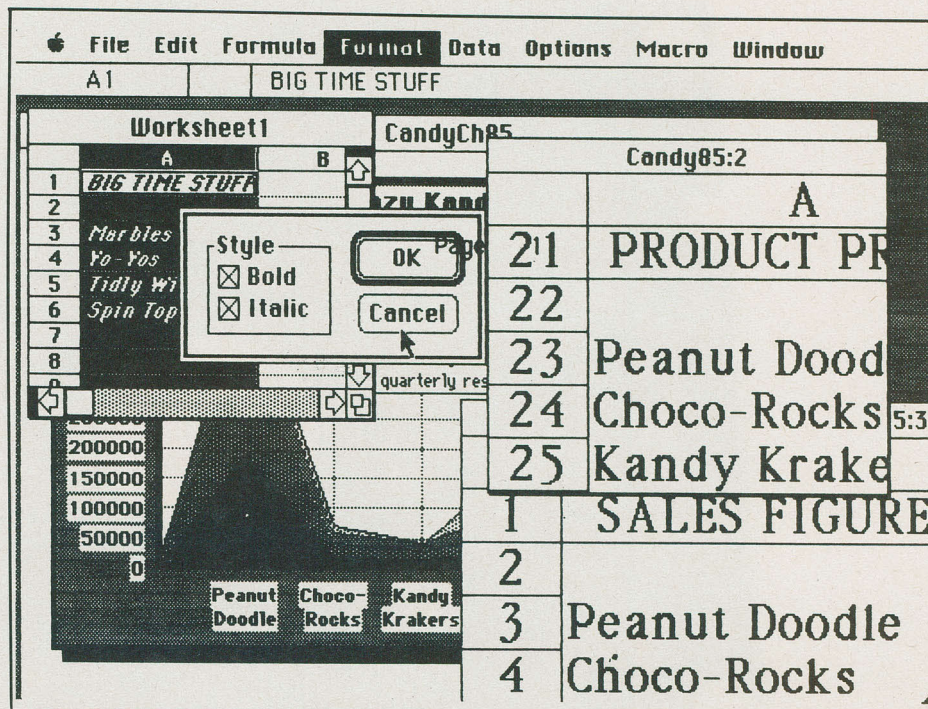
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Excel: A Better Mousetrap for the Macintosh

Spreadsheets come and spreadsheets go. Numbers, however, are constant. Here's one of the shiniest grains in the sands of time yet to emerge, a powerful new spreadsheet from Microsoft for the Mac.

by Frank Lenk



What? Another Spreadsheet? Aren't we already up to our... necks... in spreadsheets?

The capabilities of Microsoft's new Excel sound like any spreadsheet user's dream. There are all the usual math functions, format options and programming language that we've come to expect. On top of all the functionality you get something else, a graphically oriented, user friendly windowing interface with a mouse.

The Concept

Assuming you are going to get serious about the Excel on the Macintosh, you'll need a Fat Mac with an optional second disk drive. In fact, you'll probably find that... as with many such heavy duty business systems... this is only the beginning.

In any serious use of Excel you'll swiftly find yourself longing for a hard disk. It will probably take a bit longer to press the RAM limits, since Excel can cram fifteen to twenty thousand cells into a Fat Mac. Still, the software will theoretically allow up to 16,384 rows by 256 columns... that's somewhat over four million cells. Eventually somebody will find a use for every one of

them, provided the RAM becomes available.

A major drawback of the Mac is its closed architecture, which will make that extra RAM and hard disk space awkward to deal with. However, there are some counterbalancing advantages to the Mac. One of these is the 68000 that drives the Macintosh. This dandy little chip makes a lot of things happen like lightning. The other big advantage is obvious, this being the Mac's user interface.

Windowing makes sense for graphic material, but very little sense for unstructured text. The spreadsheet in essence is a graphic metaphor, and Excel demonstrates how the spreadsheet metaphor and the windowing metaphor are perfectly complementary. In this regard, the software cannot be praised too highly.

Excel uses the windowing concept to better advantage than any previous piece of software. Excel spreadsheets, charts and macros are all conveniently treated as separate windows. You can open an unlimited number of separate spreadsheet files at the same time, each in its own window. You can even open an unlimited number of windows on any single spread-

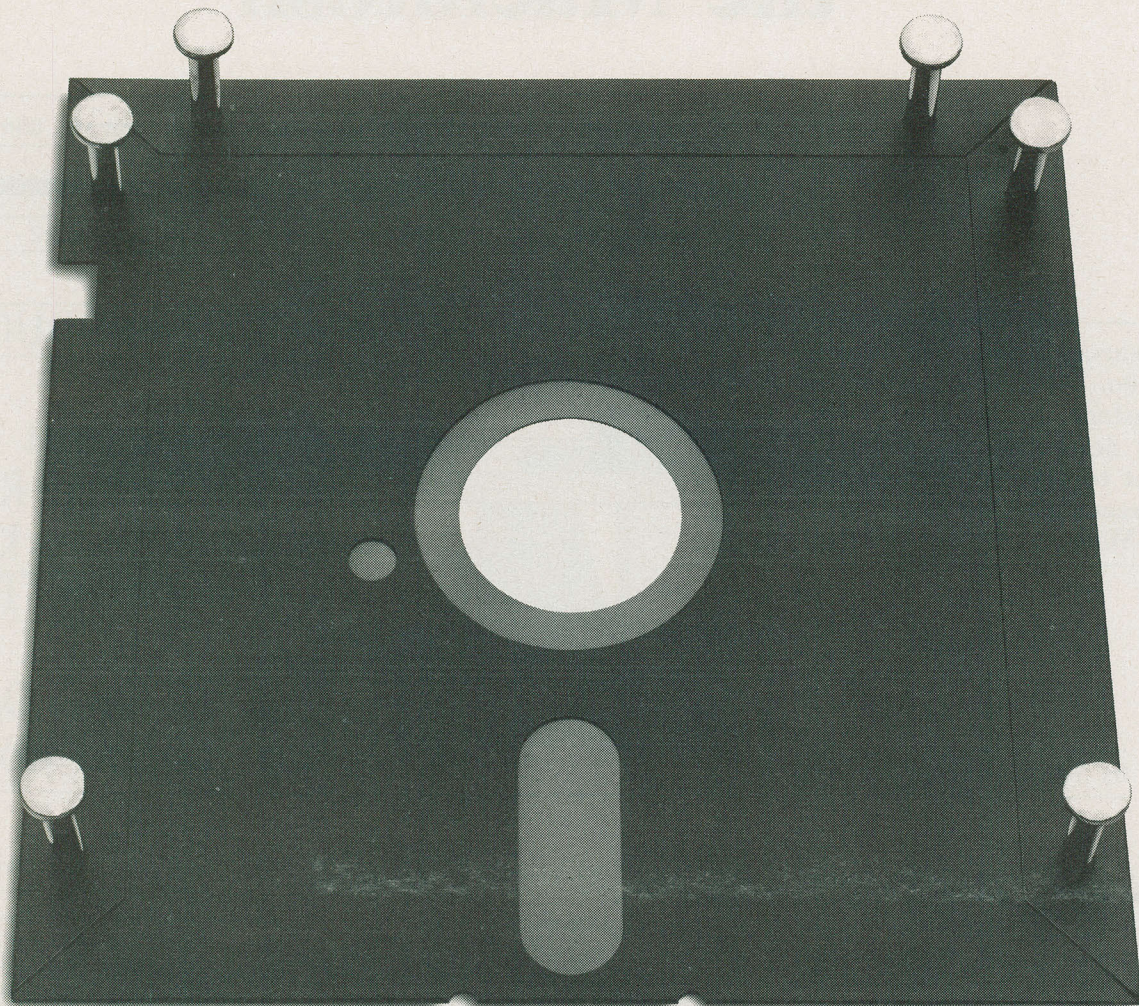
sheet, nicely getting around the problem of working on a big data structure on a small screen. Furthermore, you can split any spreadsheet window both horizontally and vertically, just by dragging a little marker along the side or bottom of the window.

Many simpler options also become a snap to select. For instance, you can change a column width just by dragging its partition over to where you'd like it. For editing and such you can select an entire row or column by merely clicking on its heading.

Once you've got your screen littered with windows, you can shuffle through them exactly as you would with pieces of paper. To help you recover windows lost down at the bottom of the heap, there's an extra pulldown menu that lets you instantly bring any window to the top. This is the same menu that lets you create multiple windows on the spreadsheet. Just select 'New Window'.

Excel can do another trick courtesy of the Macintosh system. Actually, this one works through one of Apple's afterthoughts, the Switcher. The Switcher jumps into memory and acts as referee for several applications programs. Supplied with the Excel software is a sample Switcher document

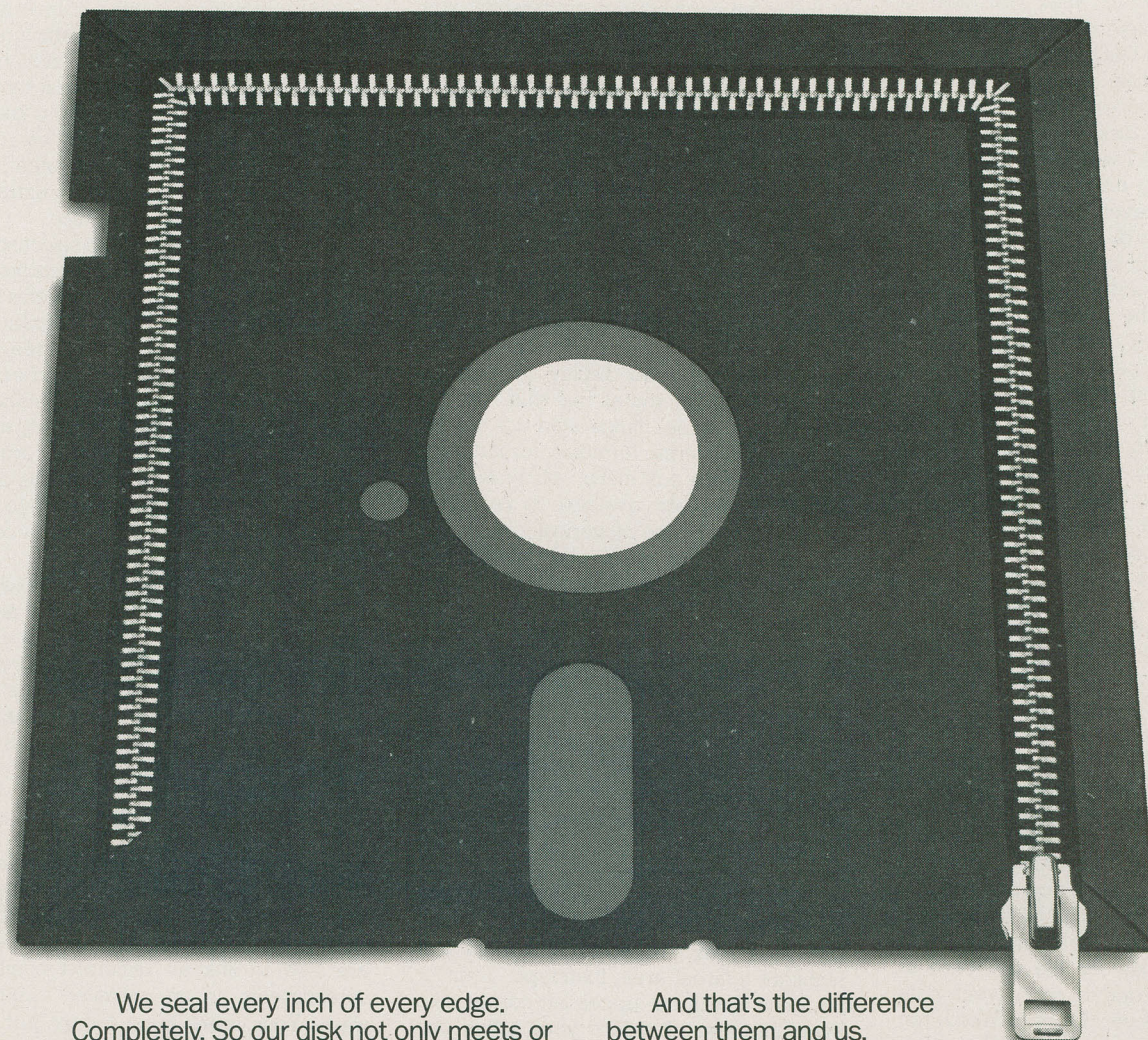
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file, which automatically sets things up so that you can have Excel and Microsoft Word running at one and the same time.

This is a good stunt, but not without its perils. Even on the mandatory two drive system, I found that getting the Switcher up and running needed some pretty deft disk management. To begin with, you have to configure your system disks. According to the documentation this requires removal of all the sample and help files from your Excel data disk, and the copying of the Word program file onto the disk. Upon running the Switcher document I was rewarded by a little box requesting insertion of the Word master disk. However, the Mac had not disgorged my data disk. The manual came to my aid, revealing that in such a case one must hit command shift 1 to release the disk, then... ignoring the onscreen message... shove the same disk right back in.

Even after this palaver, I still found that I had to stick the master Word disk in at least once in order to complete the configuration.... although I was never asked for that disk again on subsequent starts. I did find that dealing with data files tended to become a bit of a nightmare. Saving any spreadsheet file took an average of three disk swaps on the external drive. These were small files, so real business applications might be worse. This is about where a hard disk would brighten up your whole day.

The expense of such extra hardware could be justified. Once you have the Word and Excel pair running in tandem, you do get to perform some potentially useful operations. Any Excel window can be pasted over to Word. First select copy from the Excel *edit* menu. To switch applications you click the mouse pointer on one end of a little two headed arrow icon that appears at the right hand end of the menu bar. Hold down the option key on the keyboard as you do this in order to carry your data across the changeover. Once in Word, just cursor to your insertion point, then mouse the *paste* option on the *edit* menu.

Once you get an Excel graphic into your text document, there do seem to be some limits to how you can handle it. For instance, I couldn't find any way to write text along one side of the Excel image.

Excel on its own has taken a laudably practical approach to integration. Unlike some recent schizoid efforts, Excel has no identity problems. It is a spreadsheet, and nothing more. However, it has been made to include all the little frills that would make it a really fine spreadsheet. Thus you get complete business graphics, a mini database capability, and... thank the gods... no word processor at all. The database is suitable for keeping track of the sort of data that would be integral to spreadsheet calculations. Text you can always type into the cells directly.

Operation

Even before starting Excel, you find some of its convenient features enveloping you like a soft, warm security blanket. The Excel program disk bears a document called *resume*. Double click this instead of the Excel icon itself and you will automatically be returned to the exact configuration from which you last departed the program. This option gets to be a major boon, since the typical Excel session may involve a dozen separate files all needing to be opened at once.

Once you're in Excel, there's lots of basic stuff you can take for granted. Ignore the fact that you're working in a Macintosh window and you might almost imagine yourself sliding around a rather brightly lit version of Lotus... or Multiplan, or SuperCalc, or whatever. You can enter text headings, numerical data and eventually even formulae. You can reformat the column widths, the dollar display, the number of decimal places and all that stuff.

After a while things start to get interesting. In entering formulae, for instance, you can use the *edit* menu options *fill right* and *fill down*... also available as keyboard combinations, as the cloverleaf key plus R or D. The way this works is typical of Excel. You pick the upper left hand cell of your target area. Click it with the mouse pointer... a big hollow plus sign... and the cell gets a bold outline to show it as being the current active cell. Then click on the cell again and drag the mouse right and down, highlighting in inverse... black... a rectangular area of cells. Then use the fill down option to replicate your original cell down the left column or the fill right option to replicate across the rest of the highlighted area.

Other operations... such as *cut*, *copy*, *paste*, *clear* and so on... all work the same fast, easy way. To enter bulk data just highlight a target area, then type. Your input goes first in the upper left corner cell. Everytime you hit return your active cell

drops down one. When you reach the bottom of the first highlighted column, the active cell automatically pops up to the top of the next one. This makes data entry a breeze... although you might eventually want to spring for Apple's optional numeric keypad.

When creating formulae, you have access to a remarkable array of built in functions. I counted seventeen math functions, eleven advanced statistical functions, ten logical functions, seven statistical functions, fourteen database functions, eight text functions, ten date functions and fifteen special management functions. The latter group allows you to do lookups, or to extract cell references from within formulae.

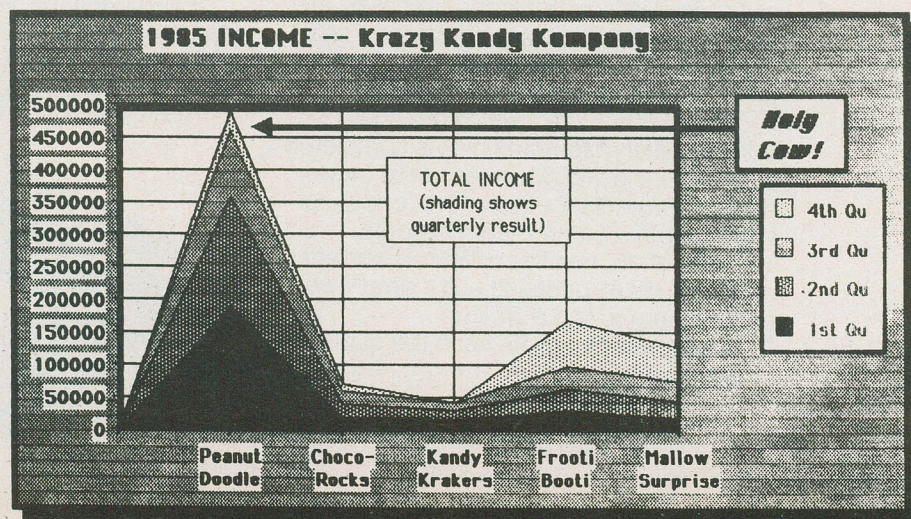
You may wonder, when selecting to *fill* or *copy*, just how Excel resolves cell references in formulas. The answer is typical of the elegance of the program. Cell references are explicitly of three types, these being relative, absolute and external. Relative references are entered in the standard Lotus "column, row" format, such as A3, B9... or whatever. If the formula is copied, Excel takes into account its original location, and adjusts the reference to reflect the relative locations of the source cell and the one referred to.

Absolute references are marked using dollar signs, separate ones for row and column, such as \$A3, or A\$3 or \$A\$3. Anything with a dollar sign is reproduced verbatim when copied to other cells.

External references represent a whole other realm of miraculous potentials. They are written as

anyname!B9

In this example, B9 could be any normal cell reference. The *anyname* is the name of another worksheet file. Consider the implications. Using external references, you are free to link an unlimited number of spreadsheets, in an unlimited number of ways. Your sheet is no longer just a flat



page. It is free to become a convoluted, many dimensional space. The linking is so easy to use that one could easily get carried away. In actuality there are some restrictions to how external references are resolved, so it's best not to use them without just cause.

As you get yourself oriented, one of the first things you'll want to do is open up a chart window or two to have a peek at the graphics goodies. This is a painless operation: just highlight the spreadsheet cells you want graphed, then select *open* from the *file* menu. A chart will appear. Once you've got it, you can do all sorts of things to it.

There are seven basic types of charts. These are area, bar, column, line, pie, scatter and combination charts. Each of these types comes with multiple display formats. For instance, pie charts can be exploded. Area charts can be plotted in five ways... with or without grid lines, and with various kinds of shading. Once you select a main type you get a large window with a gallery of sub choices.

It doesn't end there. You can proceed to do overlay charts, where one type of chart is overlaid by a skeleton view of another type, depicting a selected data series. Furthermore, charts can be dressed up by adding background shading, titles, legends, arrows, text boxes and more. Naturally the chart window is dynamically linked to the target area in your spreadsheet, and automatically shows changes. More remarkable, the chart image is linked to the actual configuration of the chart window, so that stretching the window stretches the chart rather than losing sight of part of it. Of course, you can have an unlimited number of chart windows open, each being a separate file. Once more, you may gather why a hard disk would be handy.

Speaking of dressing things up, you can do some of the same for your spreadsheet. To begin with, you get access to the usual Macintosh fonts. Font selections are global on spreadsheets... although they can be different for each spreadsheet, and charts permit mixing of fonts. Some other useful format options, however, can be set for individual cells. You can put borders around cells, on any or all sides. You can also choose boldface or italics on a cell-by-cell basis. Both options are handy for bringing out titles and total lines.

Macro Matters

No self respecting, modern spreadsheet would be caught dead without a programming language. In Excel, you create macro programs by opening yet another type of window file... a macro file.

There are at least two notable differences between Excel macros and those you get under Lotus 1-2-3. The first you notice immediately. Excel macros are usually created interactively in a record mode, as

File Edit Formula Format Data Options Macro Window					
B1		="1st Qu"			
Candy85:3					
	A	B	C	D	E
1	SALES FIGURES	1st Qu	2nd Qu	3rd Qu	4th Qu
2					
3	Peanut Doodle	120000	100000	60000	20000
4	Choco-Rocks	40000	38000	30000	27000
5	Kandy Krakers	10000	8000	7000	1000
6	Frooti Booti	24000	25000	27000	50000
7	Mallow Surprise	32000	40000	41000	80000
8					
9	Total Sales.....	226000	211000	165000	178000
10					
11					
12	Mallow Surprise	0.59	0.69	0.69	0.69
13					
14	Total Sales.....	1458285.65	1373585.95	1053506.05	1051045.85
15					
16					
17	Mallow Surprise	18880	27600	28290	55200
18					
19	Total Sales.....	729140	686790	526750	525520
20					
21	PRODUCT PRICES	1st Qu	2nd Qu	3rd Qu	4th Qu

they would be with a utility such as ProKey. What this means is that without knowing anything about macros or programming you can... theoretically... go about creating your own time saving commands.

The process is simple enough. Open a macro sheet, select the area you want to use for your macro... probably column A... then select the *set recorder* option from the *macro* menu. Next, go to the spreadsheet you plan to work with. When you're ready, select *start recorder* on the *macro* menu. Perform the operation you wished to record. When you're done, pull down the *macro* menu once more and select *stop recorder*. When you go back to the macro spreadsheet, you find that your program has magically appeared in the appropriate area.

You also discover the other major difference between these and Lotus macros. Excel macros are legible. All the commands appear in something at least resembling plain English.

When you complete a macro you must name it, using the same naming convention used for naming any area of a spreadsheet. You also have the option of attaching a command key to it, so that you can run the macro with a single key combination.

Once a macro is entered, you are free to edit it exactly as you would a set of formulae entered in any part of a spreadsheet. Of course you could also write the entire program from scratch, if you knew what you were doing.

I found that knowing what you're doing is a large asset in any case. I had little luck with macros whipped off on the fly. It took considerable deciphering of command functions and editing of cell references to resolve all the conflicts. Much of this had to

do with the differences between absolute and relative references. No doubt the troubles would be swiftly overcome as one got to know the system. Still, it does indicate that interactive entry has not entirely flattened the learning curve.

Excel macros use the windowing interface to provide a nice feature not available in Lotus. Using the INPUT() function calls up a dialogue box, with an optional text prompt and title. This makes user interaction very slick and goof proof. On the other hand, Excel seems to lack Lotus' ability to make up custom menus identical in form to the standard program menus. In Excel this would be equivalent to creating custom pulldowns... rather a lot to expect. The Excel macro language seems to be a rich one, so the skillful programmer would no doubt find some reasonable alternative routes to the same end.

Higher Learning

Despite its imposing array of capabilities, Excel is not an especially difficult system to learn. It would be nice to credit the windowing metaphor for this gently sloping learning curve... nice, but not accurate. Windowing mainly aids functionality. Ease of use comes from the mouse. Ease of learning comes from the menu structure. The fact that all the commands are visibly available onscreen definitely reduces the need to pore over manuals. However, this applies to the simple text menus of Lotus 1-2-3 just as well as it does to the fancy graphic pulldowns of Excel.

Still, Microsoft has taken the menu thing to some extremes. For example, you can select *paste function* from the *formula* menu... and view a window showing a scrolling list of all the available function

operators. It's a bit like having a menu driven word processor that has the entire English language on a pulldown menu. Grabbing the *about Excel* option from the standard Apple menu presents another scrolling list, this one showing a vast array of help topics.

This does not imply any skimping in the paperwork department. Excel is accompanied by four manuals... no two of them bound in matching formats. There's a user's guide, an IBM style three ring binder containing a very healthy tutorial section, a complete reference to all the many menu options, some appendices and an admirably complete index. Then there's the "Arrays, Functions and Macros" manual, a spiral bound tome that contains reference to exactly what its name implies. Finally there are two pamphlet style documents. The larger of the two deals with using Switcher with Microsoft applications, while the smaller is a highly handy quick reference guide. The latter... surprisingly... does not contain long lists of commands and functions. Instead, it presents step by step instructions for using operators, starting and quitting, recording a macro and other common operations.

Strangely enough, the varying formats of all these books turn out to be an advantage. You get to know each as an individual. Each has a specific style, well suited to the material it presents. In short, the Excel documentation is just as well crafted as the program itself.

Spreading Out

One might well ask if the world actually needs another spreadsheet. Based on Excel's performance, the answer is a firm, unqualified maybe.

Right now, Lotus 1-2-3 seems to have captured the hearts of business. Even Lotus itself couldn't do much to dislodge 1-2-3 with its own upgrade, Symphony. The point is, there is a delicate balance of performance, usability and availability that determines a winning piece of software.

Excel truly is an excellent package... but does it make the quantum leap into immortality? The answer is probably not.

Microsoft says it "made a conscious decision to put Excel on a Macintosh." It maintains that "users found the Macintosh better, easier to use." Apparently thirty-five percent of Mac owners have bought Microsoft's Multiplan, and eighteen percent have gone for Microsoft Chart.

True, the Mac is in many ways a wonderful machine. However, it is not without faults, including limited memory, slow disk access, and limited interfacing capability just to name a few. Microsoft seems to anticipate that most of these faults are soon going to be rectified. They're probably right. However, the limitations of Lotus are similarly being addressed... as, for instance, by the new Intel/Lotus extended

memory standard.

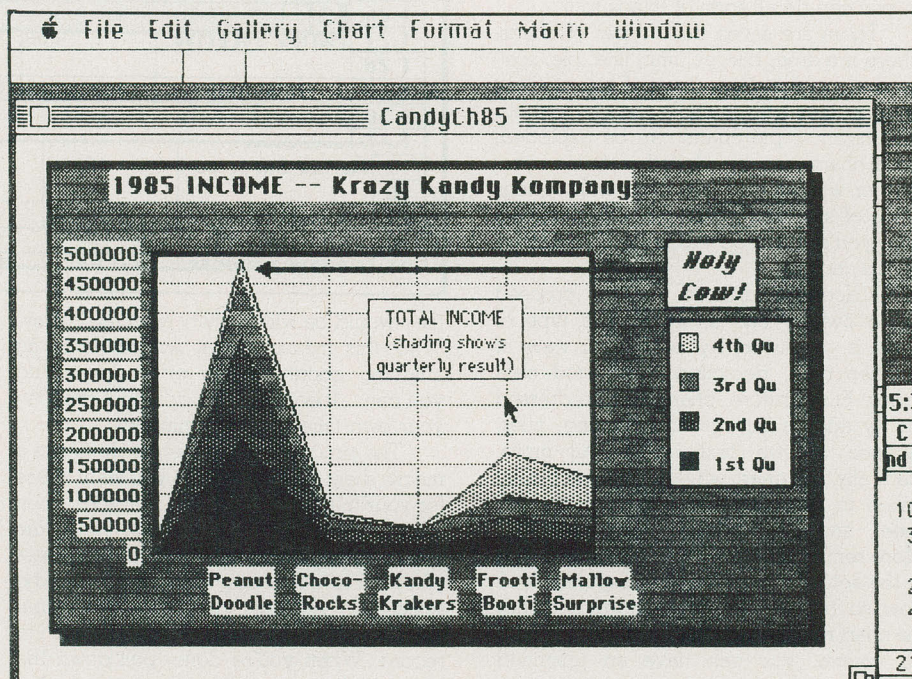
Taking no chances, Microsoft has ensured that a lone Macintosh running Excel can easily coexist with an office full of PCs running Lotus. Excel can ingest Lotus files directly, and converts them automatically. Similarly, Excel can be made to spit out Lotus files, simply by choosing the 'WKS' option when saving them. File transfer between the Macintosh and the PC is a trivial business, using relatively inexpensive communications packages.

'MacLink' was mentioned by the folks from Microsoft as being one good option.

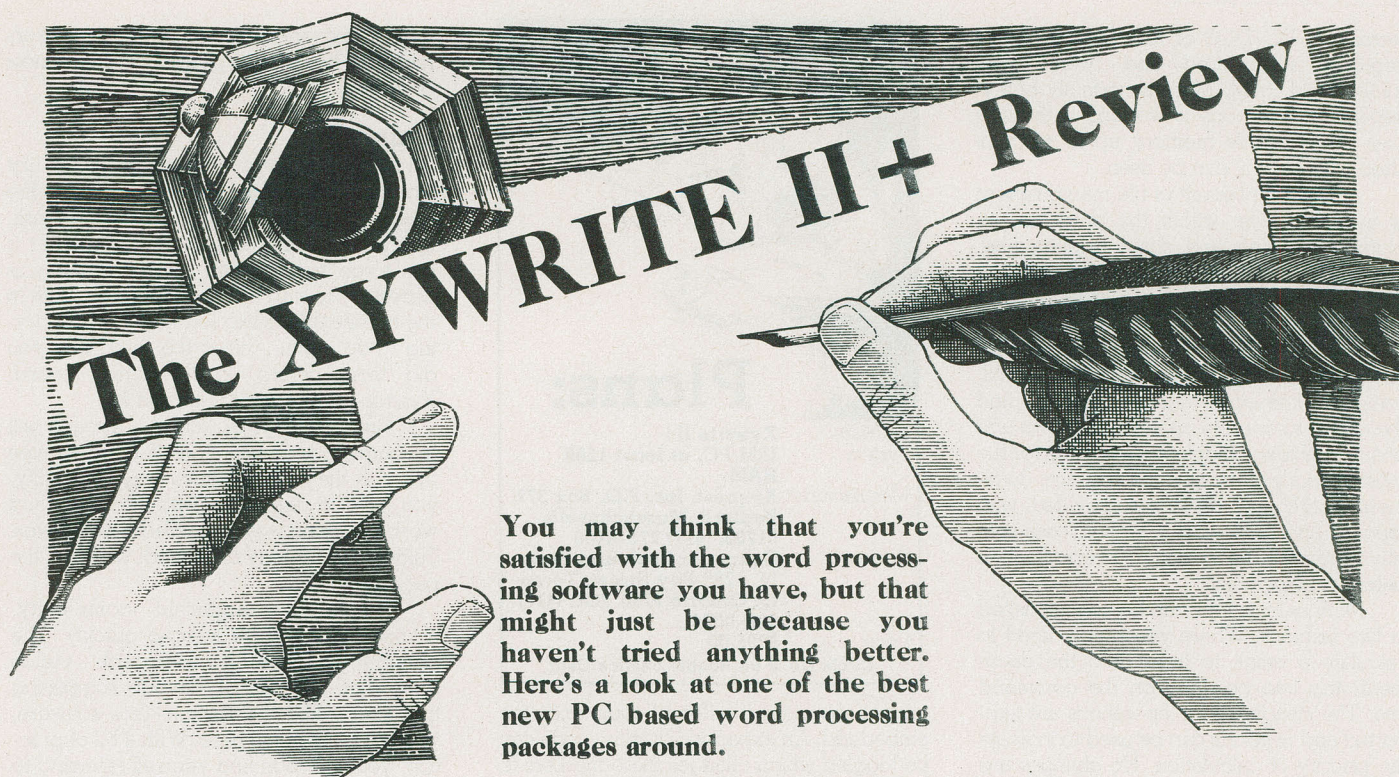
Apparently it sells for about two hundred dollars.

Microsoft is being rather cagey on some issues concerning Excel. Although the Macintosh implementation is being propounded loudly just now, there have been intimations of a possible MS-DOS rendition of the software. If you already own a Mac and plan to do any number mashing, you should rush out and buy Excel immediately. However, if... like most business users... you have some other kind of microcomputer... you might well want to wait and see how things go.

CNI



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You may think that you're satisfied with the word processing software you have, but that might just be because you haven't tried anything better. Here's a look at one of the best new PC based word processing packages around.

by Donald G. Roy

Should your word manipulation desires have recently exceeded WordStar's ability to move things about...an altogether possible occurrence... you may be looking for another alternative. If speed is very important, you may not be overly pleased with Micropro's newest offering and are exploring the jungle for alternatives.

Getting used to a new word processor is not a trivial experience. You have probably been with your current one longer than you should, but the comfort and familiarity pull you back like a siren's song when thoughts of upgrading surface. It's all such a gamble, with tradeoffs, risks and having to relearn how to perform the most basic tasks in a new environment.

Be warned ahead of time. Xywrite II + is mainly for users who need a lot of power in a word processor, and don't mind paying for it in convenience. However, if your needs demand a fast and extremely complete package of advanced features, you probably should consider trying this software.

Command Driven

Departing from the concept of inserting control sequences directly in the text, Xywrite splits the display screen into two areas. At the top is a three line area for command entry, prompts and the ruler line, which can be toggled into a help index. Hitting function keys five and ten flip you in and out of the command line, respectively.

This can be a bit of a pain, however advanced users do have the ability to insert codes directly into the text.

The program's speed comes from the fact that most of the code, and the text file, remain in memory while editing is in progress.

Xywrite takes about eighty kilobytes of overhead. Allowing another forty for DOS, the balance of memory remaining in your machine is available for text files. A windowing facility provides the ability to edit an additional document or keep a directory listing available through the program's DOS interface. The *Alt f10* key sequence moves you back and forth between windows, which can be oriented and sized to your particular tastes. Extensive use is made of the function keys, alone or combined with the shift, control and alternate keys to reproduce many of the commands that can be entered above the text display.

Among some of the more advanced features of the program are the ability to use the IBM extended character set from the keyboard, programming macros with a utility to create, store and edit them, built in math, creation of special printer characters through bit mapping and access to QWERTY, Dvorak or user defined keyboard drivers. If that's not enough, more conventional abilities include the windows already mentioned, flexible footnoting, generation of tables of contents and indexes, a mail merging facility and the support to create on screen forms.

Printer support is extensive and current in the reviewed version. In excess of eighty different models are supported, with the potential to write your own if need be. A few laser printers are included in the list and the only anomaly is that there appear to be two separate files for the HP ThinkJet printer. Installation for any of the directly-listed models is a snap, using an install routine written in the macro language of the package. After this, you will be ready to go... well, almost.

Sorting out where to start in the Xywrite documentation is the next step. Aside from the reference manual, a major work of over four hundred pages, there is the *Quick Start tutorial*, the *installation guide*, the *basic word processing tutorial* and the *applications tutorial*, each as a separate book or booklet. Actually, it's not too bad, but the amount of documentation is astounding.

The tutorials are useful and oriented to a person who is fairly new to word processing. If you are an experienced user in another package, it will take a bit of slugging to get through these pages to learn the new commands. The style of writing in the tutorials is very step by step... and they explain each step as you go.

Files

Xywrite includes a full DOS interface, including access to directories and subdirectories, the ability to run any DOS command under the program or for that matter any executable file that also resides on a valid drive. The program will function with any

version of PC-DOS or MS-DOS and only requires a hundred and twenty-eight kilobytes of RAM. More is certainly better, especially when one is working with large files. All available memory up to six hundred and forty K can be used.

A full complement of file manipulations is available from within the program, including merging and chain printing files. Straight ASCII files can be read into the editor, so WordStar files would have to be stripped first.

Editing facilities are similarly extensive. Aside from operating by the word, sentence, line or paragraph, you will find the ability to operate on defined blocks and columns of text. Undelete is available for the most recently cancelled part of the document. Search and replace is provided, with forward and backward searches, case sensitivity levels and selection of verification before replacement.

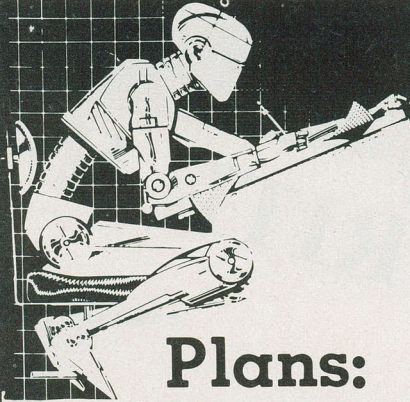
Math calculations can be accomplished in two fashions. Where you simply need to calculate a result to insert into the document, this can be done on the command line. The standard four operations are supported and brackets can be used to indicate the priority of calculation. No changes are made in the document. You may also wish to add up a column or row of numbers that is already in the document. With suitable commands and cursor movements, this can be done with the total inserted at the point you specify.

A feature called *save/get* allows information to be saved to memory, or a file, and recalled with appropriate keystrokes. Up to thirty-six of these may be specified. This allows for the creation of "boilerplate" text, cutting and pasting between documents in different windows and for saving executable macros. *Save/gets* can be displayed, edited, added to, printed and cleared.

Formatting

Again, the list of operations supported in altering the format of documents is exhaustive. Four justification modes, four case commands and the same number of print enhancement controls are provided. Date and time stamping is available within the document. A very flexible series of footnoting and endnoting functions orders, along with running page headers and footers can be issued. Margins, line spacing, page breaks, non-breakable blocks, automatic indentation of paragraphs, printer pause controls... the list just goes on and on.

Typically, these adjustments are inserted by placing the cursor at the point in the text where the desired effect is to happen, then switching up to the command line and entering the command. The effect is noted in the document area by an extended ASCII character, but these are difficult to in-



Plans:

Software:	Xywrite II+
System:	IBM PC, at least 128K RAM
Manufacturer:	Xyquest, Inc. P.O. Box 372, Bedford, Massachusetts 01730, (617) 275-4439
Dealer:	Computer Book and Supply, 1263 Bay Street, Toronto, Ontario M5R 2C1, (416) 926-0064
Price:	\$395.00

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terpret especially if different commands are embedded. An expanded display mode can be toggled which changes these markers to something more intelligible and it is from within this mode that the expert Xywrite user can enter the format controls directly. In this approach, there is no need to constantly move back and forth between the command area and the text screen.

The applications tutorial book covers more advanced concepts. Working with columnar material is eased with the features of Xywrite. Decimal tabs allow numeric information to be aligned at the decimal point and combined with move commands, you should never have to import a Lotus file just to create a table. An extensive lesson on footnoting leads you step by step through the process, allowing adjustment of text on the page to fit the notes, or having them spill onto another page if too long. Further lessons are provided to cover the finer points of creating tables of contents and indexes.

Perhaps one of the most powerful features of Xywrite is the macro facility. Like Lotus 1-2-3, any series of keyboard command sequences can be stored to memory of file and recalled for use. Unlike the spreadsheet, this package will automatically record commands as you enter them, creating the macro in memory. Using these programs, automatic formatting of text is possible and switching between printer files becomes a treat.

Program defaults can be changed, or specified at startup through a kind of Autoexec file as the program loads. As well, you can write your own help screens to use within the program, or edit the existing ones. All of these features combine to pro-

vide a text oriented development environment that has definite possibilities in business or writing.

Practice

While the process of learning your first word processing program, especially the more powerful ones, is a trying task, upgrading from one package to another is not a job to be taken lightly. It really is necessary to start from ground zero, both in the routine affairs like formatting and in trying to do certain things the same way you did them before. In this latter regard, Xywrite can be a bit unforgiving.

Finding that a particular approach will accomplish your intentions is no guarantee that it is the most effective way. In reality, you have to start again with the basics and work the trying way up the ladder of power. Taking this strategy does work well with the package.

Despite it's apparent complexity, routine tasks can be learned quickly. The command oriented approach yields somewhat of a dBASE flavour, suggesting that if you like the Ashton-Tate software, you will be at home here. With a bit of practice, you will soon find yourself referring to the keyboard command guide, that attaches to the left of the function keys, for the more powerful features. There are some abilities that simply cannot be done in WordStar, so if they are suitable to your needs, then the effort will be worth it.

What rapidly becomes apparent is that this word processor does offer exceptional speed and capability, at a moderate price.

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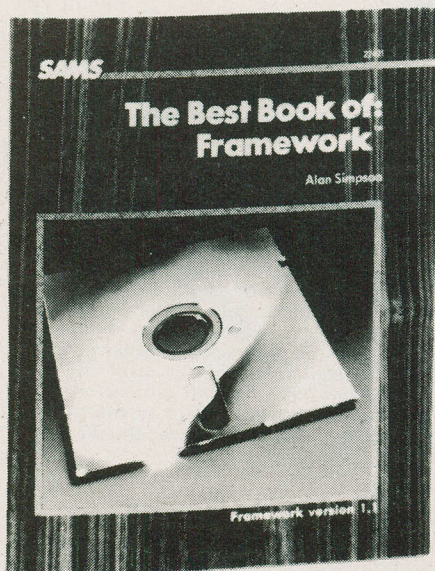
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Hard Copy

Computer books are everywhere. Here's what's been added to the library recently.

Software

● *The Best of: Framework*, by Alan Simpson, provides readily understood advice and hands-on example solutions to various every day business problems using **Framework integrated software** on an IBM PC. Including an introductory tutorial for novice users, and more advanced techniques for the more experienced, *The Best of: Framework* also provides complete techniques for using *The Source*, *CompuServe* and *Dow Jones*, as well as for interfacing with *dBASE* and *WordStar*. *The Best of: Framework*, from Howard W. Sams' "Best Book" series, will sell in the U.S. for \$15.95.

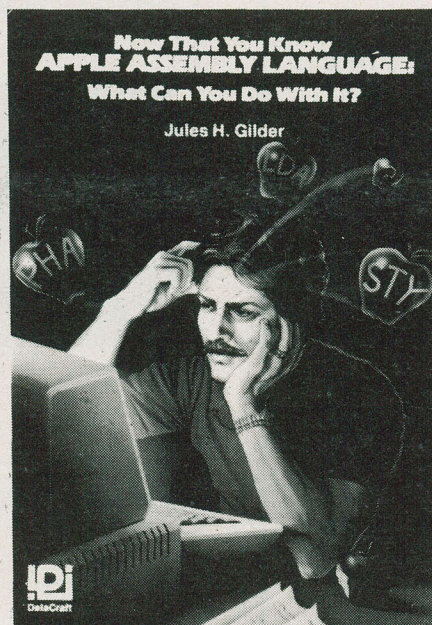


● A guide to *dBASE III* commands and features, *The dBASE III Handbook*, provides full discussion of basic and advanced operations for displaying and editing data, and addresses such features as the differences between *dBASE II* and *III*, methods for data record sorting and file indexing, and the built-in functions for performing sophisticated mathematical operations. Written by George C. Chou, the Handbook will retail for \$19.95 American, and is available from Que Corporation. Refer to order number 178, ISBN 0-88022-159-3.

● Published by Addison-Wesley, *Modula-2* by Edward J. Joyce is a **guide and manual** to the highly structured programming language *Modula-2*. Including a quick primer for Pascal programmers, self-study problems, program examples and detailed appendices, *Modula-2* sells for \$21.95 Canadian.

● Also from Addison-Wesley, *The Software Developer's Sourcebook: From Concept to Completion*, by Blaise W. Liffick, shows programmers **how to design and write structured programs**, apply human engineering principles to software, use efficient testing and debugging techniques, write effective system and user documentation, and maintain programs. It costs \$21.95 Canadian.

● *Now That You Know Apple Assembly Language: What Can You Do With It?*, by Jules H. Gilder, takes readers through the **assembly language programming experience**, showing how to develop your own library of useful subroutines, and delving into the mysteries of the 6502 stack and Apple's built-in subroutines. Including a free Programmer's Number Conversion System, this book costs \$21.95 American, including postage and handling, and is available directly from Redlig Systems.



Hardware

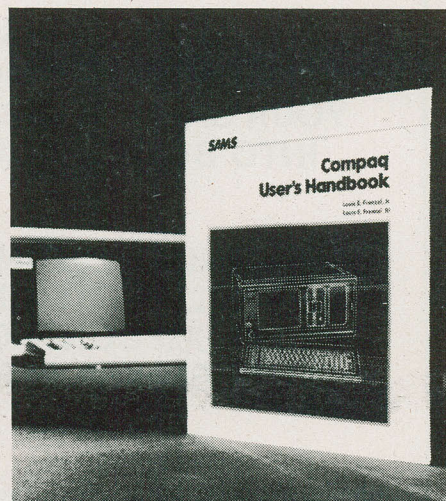
A guide to *Epson* and compatible printers, *Epson, Epson, Read All About It!*, written by Julie Knott and Dave Prochnow, describes and compares the major printers, explains their secret capabilities, provides programs for high-resolution graphics, demonstrates how to get the best out of word processing packages, and discusses maintenance.

The guide costs \$18.95 Canadian, is published by Addison-Wesley, and is available in book stores.

Portables

● Father and son authors Louis E. Frenzel, Jr. and III, have written the *Compaq User's Handbook* to **support and enhance** the Compaq's factory manuals by extracting, simplifying and organizing the most useful information, and adding new material. Coverage is devoted to applications and systems software, languages and utilities, BASIC programming, graphics, sound and music, and hardware and peripheral details.

Retailing for \$15.95 American, the Handbook is available in bookstores, or direct from the publishers, Howard W. Sams.



● From Que Corporation comes *The HP 110 Portable: Power to Go!*, written by Dale Flanagan. Both an introduction for novices and a source of in-depth information for the experienced user, this book offers a **comprehensive review of hardware and software features** of the Portable, including discussions of its built-in programs: Lotus 1-2-3, MemoMaker, Personal Applications Manager and the terminal program.

Quote order number 165, ISBN 0-88022-135-6 when ordering. The cost is \$16.95 American.

Free!

IBM Canada has announced the publication of the first Canadian issue of *The Directory*, a **catalogue of software** developed for PCs by IBM employees. Averaging around thirty dollars in price, these programs are grouped into five categories - entertainment, education, productivity, programming and business applications. To get your free copy of the catalogue, call IBM's toll free number 1-800-387-6100.

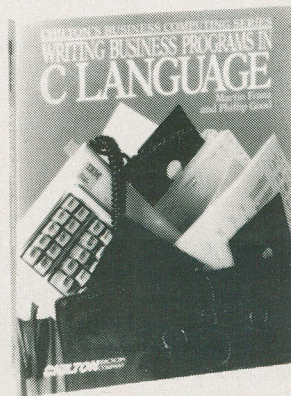
Going to C

• **Two books on C** by Jack Purdum are available from Que Corporation. The popular tutorial *C Programming Guide* has been revised to include the latest developments in C programming, such as tips, tricks and techniques that experts use. The *C Programming Guide*, Second Edition will cost \$19.95 American; refer to order number 188, ISBN 0-88022-157-2.

Designed as a supplemental learning tool to the Guide, the *C Self-Study Guide workbook* will cost \$16.95 American; refer to order number 176, ISBN 0-88022-149-6.

• Authors Martin Franz and Phillip Good have produced a book which gives managers, analysts, consultants and programmers the power and performance they need to **write mass-market programs in C**. Presenting practical models to run, modify and adapt to individual needs, the book teaches the calculations, character manipulations and file management needed to develop programs.

Writing Business Programs in C Language will cost \$16.95 American in bookstores, or will be available for an added \$1.75 directly from the Chilton Book Company.



• *Common C Functions* by Kim Brand, presents tested functions which can become building blocks in a C programmer's **software tool kit**. Providing examples of working source code, the book displays dozens of C functions that are designed to teach C coding techniques. All the code is available on a companion disk, sold separately. Sold in computer and bookstores, *Common C Functions* is also available directly from Que Corporation for \$17.95 American, order number 148, ISBN 0-88022-069-4. The companion disk sells for \$49.95.

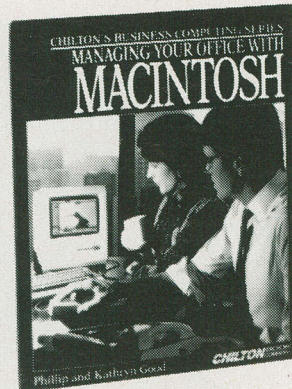
MacBooks

• *Macintosh Pascal Illustrated: the Fear and Loathing Guide* by Scott Kronick, presents **Mac-Pascal** as sharp, active and ripe for improvisation while avoiding tedious flowcharts, grammar lessons and end-of-chapter exercises. Even for programming beginners, this guide makes programming not only entertaining but exciting. From Addison-Wesley, the guide sells for \$21.95 Canadian.

• *Managing Your Office with Macintosh* by Phillip and Kathryn Good, is designed to guide the reader to the **software needed for business applications**. Teaching, among other

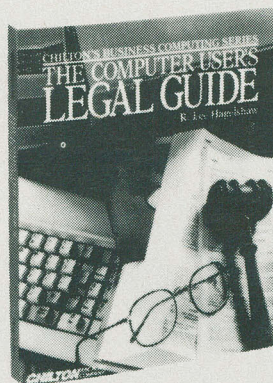
things, the use of spreadsheets, sales analysis, chequebook reconciliation, project scheduling, charts, line graphics and plots, the book also covers letter and report creation and editing, client list creation and updating, inventory maintenance and mass mailings.

Available at book and computer stores for \$16.95 American, or directly from the publishers, Chilton Book Company.



Keep it Legal

Information about **legal rights and liabilities** related to the use of computers is now available in R. Lee Hagelshaw's *The Computer User's Legal Guide*. Outlining the circumstances that require legal services, and offering advice on choosing an attorney, the Guide is published by Chilton Book Company, and is available for \$16.95 American at book and computer stores.

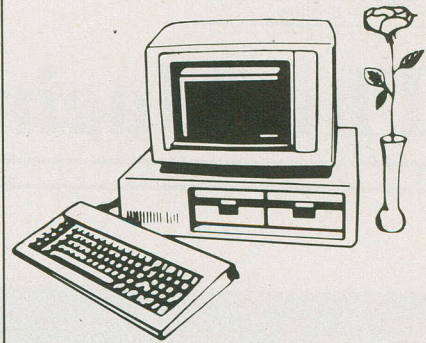


Keep it Healthy

A source of information on the **potential health hazards of VDTs**, *Terminal Shock: the Health Hazards of Video Display Terminals* by Bob DeMatteo is available for \$9.95 Canadian from NC Press.

Publishers

• Chilton Book Company, Radnor, Pennsylvania 19089, telephone (215) 964-4000 • NC Press Limited, 31 Portland Street, Toronto, Ontario M5V 2V9, telephone (416) 593-6284 • Que Corporation, 7999 Knue Road, Suite 202, Indianapolis, Indiana 46250, telephone (317) 842-7162 • Redlig Systems, 2068-79th Street, Brooklyn, New York 11214, telephone (718) 232-8429 • Howard W. Sams and Company, 4300 West 62nd Street, Indianapolis, Indiana 46268, telephone (317) 298-5400 **SN!**



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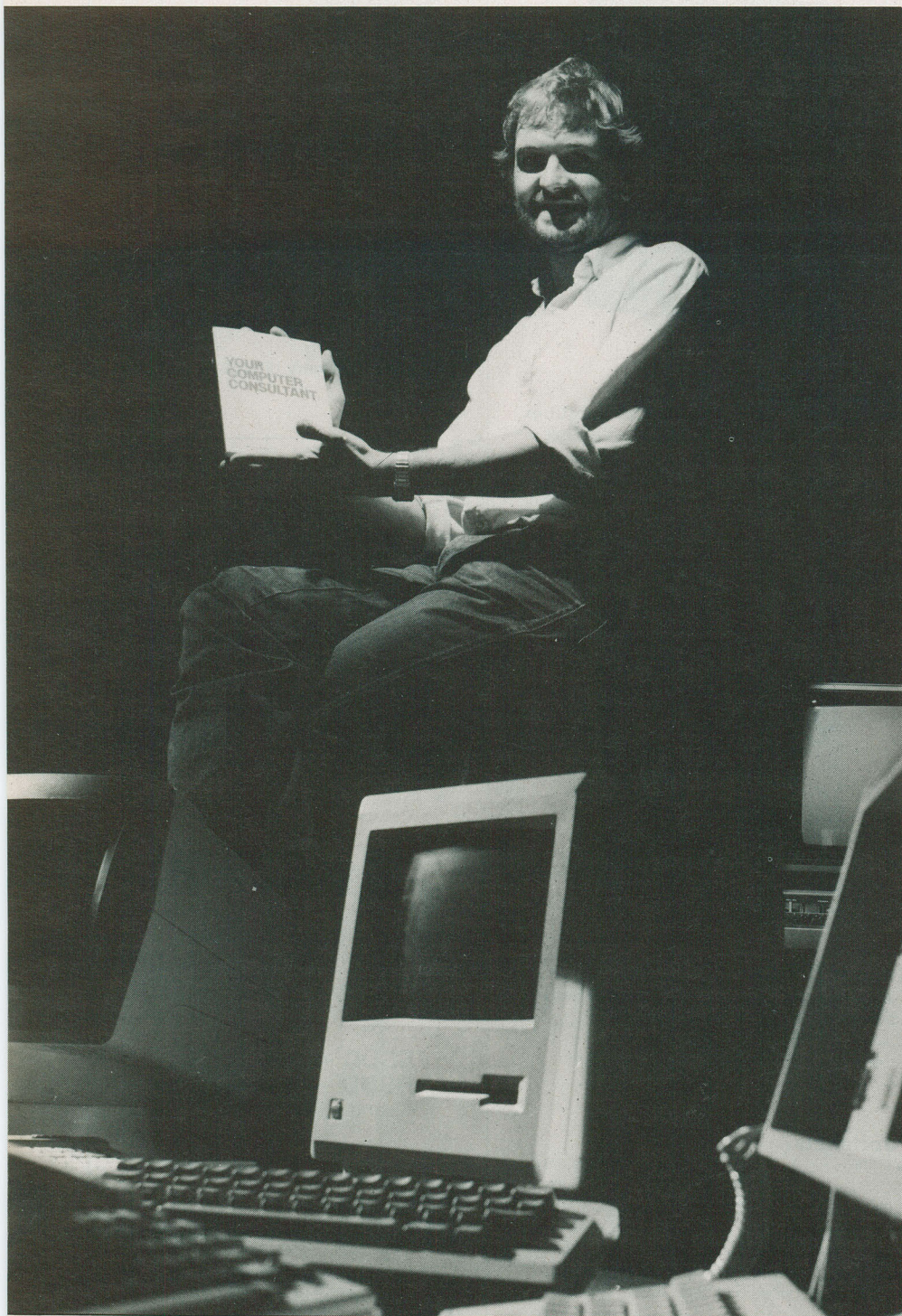


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The Macintosh Author



Far more than just getting one's words clattering from a printer, the Macintosh is capable of assisting writers through the entire process of creating a manuscript. Whether you write business reports or freelance articles, check out these applications for authors.

by Jonathan Chevreau

Despite the interest in products like Lotus 1-2-3, Multiplan and Excel, the biggest single application for microcomputers is word processing. Computers like the IBM PC, and especially the Apple Macintosh, are a boon to writers. About seventy percent of all microcomputers are used for word processing according to industry estimates.

This article will talk about how a writer can turn a "Fat" Macintosh into a writing machine. Notice the choice of words. This does not mention word processing. Word processing is only one stage of the writing process, and a fairly late one at that.

With the right tools on a computer, writing becomes literally a series of automated steps. From the conception of a piece to the finished work, the process is not unlike the factory production of any physical good. This article will outline how several programs can be used and combined to automate virtually every step of the writing process. It reviews five programs that help in stages of calling contacts, note taking, quote and fact retrieval, outlining thoughts and structuring a story and finally word processing followed by a spelling check.

To return to the writing factory, the programs that we'll look at in this context are Habadex and Habadialler, Factfinder, Thinktank, MacWrite or Microsoft Word and Hayden Speller or Mac Spell Right.

There's more. These programs do not have to be used separately, one after the other. With a new Apple program called Switcher, a writer can switch back and forth between two or three of any of these programs with interesting results.

Calling Sources

Except in the world of fiction, most writing first requires research. This is normally obtained by talking to people, usually on the telephone. A number of programs are available for the Macintosh to keep track of frequently used sources.

The first one available was Habadex, which is a desk organizer as well as a three hundred card electronic rolodex. The program has been greeted with mixed reviews but it does get the job done, and the price has fallen to half of its initial level.

Habadex allows the writer to plan his days and weeks ahead. An entire month can be displayed on the screen, and then any day can be zeroed in on for more detail. This yields an hour by hour listing of appointments. A "to do" list is ticked off gradually. Because writing is a business, a space allows a record of all expenses incurred in a day to be recorded.

Habadex features, on the left side, a desktop which resembles the old physical telephone address book your parents probably used. Made of plastic or metal, it had a small pointer on the right side that could be placed next to the letters of the alphabet. Press the release button at the bottom, and the lid flew up and all the addresses for the chosen letter were there to read.

Habadex tries to reproduce that book on the computer, but it goes one better. You can arrange your contacts by last name, by company or even by special categories you may designate. Upon choosing the letter C, for example, it will list every person whose last name ends with C, complete with business or home telephone number. To get more information, you would double click the name of the person you wish to talk to, and a screen sized data record would pop up, giving you the full address and other data. When entering names in the first place, this also serves as the data entry form.

Haba Systems, the maker of Habadex, has also created a product called Habadialler. It is a desktop accessory that is installed into, for example, your favorite word processing program. Then, if you wish to call a contact, instead of having to save, close and eject MacWrite or Microsoft's Word, you can simply access

this version of Habadex under the Apple symbol on the top left hand side of the screen. It is connected to a modem and electronically dials your contact.

Habadex was one of the first of these programs, but a seemingly endless number of competitors have since appeared. These include Day Keeper Calendar from Dreams of the Phoenix Incorporated, the Desk Organizer by Warner Software Incorporated, DeskToppers by Harvard Associates Incorporated, MacCalendar by Videx Incorporated, MacDesk by Inter-matrix, MacOffice by Creighton Development Incorporated and a half dozen more.

Note Taking

As any journalist who has struggled to keep up with a fast talking source knows, taking notes in interviews can be a trying process. Many writers have difficulty getting down every word someone says without using a tape recorder. I have found that, in a telephone interview, I can type directly into the computer more quickly and accurately than entering notes longhand into a steno pad. I am a fast typist, but slower typists may benefit from a new Macintosh program that allows a code to be substituted for the full word.

Quickword, called a "word processing expander" by its maker, EnterSet Incorporated, works as follows. By typing *Mc*, for example, the computer would automatically print Macintosh.

Notes can be typed directly into the word processing program, but I have recently discovered a couple of programs that are perfect for this stage, Factfinder and PreWriter. PreWriter, from MindWork Software Publishing Incorporated, is called an idea processor. It gives one simultaneous access to outlining, index card handling, text processing and idea manipulation. It can exchange files with Microsoft Word, MacWrite, Thinktank and FactFinder. It allows you to arrange and rearrange lists of

quick notes.

Factfinder, from Thoughtware Incorporated, allows the user to take down notes in a free form manner. Instead of dealing with preset fields and structured data bases as one would with filing programs like PFS File or Microsoft File, Factfinder offers the writer a number of loose electronic factsheets. A group of factsheets represents a stack. This is not unlike a physical notepad on your desk that you would grab to jot down notes on. The advantage is that with the electronic version, you can have any number of different stacks of notes, which permits the writer to organize by subject matter. A set of unrelated factsheets would be part of another stack. Key words are selected in each factsheet for later retrieval.

For example, you may be working on two stories. Let's say that one is on compact disks and another on artificial intelligence. Stack one might be called *Com* and stack two *A.I.*, for example. Both of these would be represented with small icons that resemble a stack of notes.

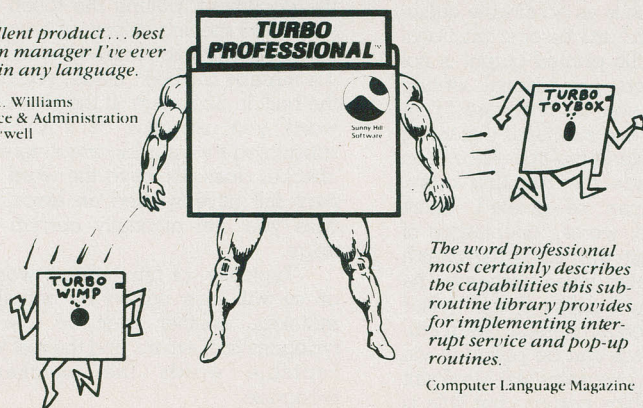
Moving into *Com*, you would have available a large quantity of note pages on which facts can be gathered for a story. If you called an expert at one company, you'd label the note *Company 1*. You'd enter the contact's name, his telephone number and everything he or she said.

Initially, Factfinder breaks the screen into two parts. The latest stack of notes is on the left side. On the right are three windows that allow you to organize your notes and find data. One of these windows indicates how many fact sheets are in a given stack. Once you search for a keyword or combination of keywords, the window indicates how many of the fact sheets in that stack contain the keywords. The keywords previously designated by you are displayed in the second window. In the third window, you enter those keywords that will call up the set of notes you want to retrieve at a later date.

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Requires Turbo for compatibles. Turbo Pascal & Sidekick Trademark Borland Intl.

While in the left side, you can zoom a note up to occupy the entire screen, eclipsing the windows on the right side. At this point everything runs just like a stripped down word processor. You can type in words, backspace, delete and cut and paste just like you can with MacWrite or Word. And in fact, by cutting and pasting through Switcher, anything you write could be directly imported into an actual word processing document.

However, note taking seldom translates into finished word processing. There are a few steps to go before we get to that step. Many other sources have to be telephoned, and each gets their own fact sheet identified with their name.

To retrieve data at a later date, for example, certain numbers or quotes, it is necessary to spend a few seconds thinking about what keywords uniquely identify a given fact sheet. You can mark several keywords with Factfinder. For example, in the compact disk story, you could mark "compact", "disk", "Sony" and the name of a memorable contact. The marking is easily performed. You select a word or phrase with the mouse just as you would do if you were going to cut and paste. Then you pull down the *Keys* menu and click on the *Mark* option. This can also be accessed by using the four leaf clover key and the letter *M*.

Once you close up that factsheet and start talking to others, you can always call up the original factsheet by using the find function. You can enter a combination of words using such boolean functions as "and", "or" and other operators.

At the beginning of a story, I run Factfinder in parallel with Habadex. Both programs can be accessed instantly because of Switcher. You switch back and forth between them. If I have to initiate a call to a particular source, Habadex will automatically dial him. If someone else calls me back, I can switch into Factfinder to take that information down. I leave the programs up all day.

Fact Retrieval, Outlining and Rough Word Processing

The facts gathered, I remove Habadex and install Thinktank 512 with Factfinder. On the Fat Mac, Switcher typically lets you run only two major applications.

The old 128K version of Thinktank, developed by Living Videotext, was an idea processor or outliner. Since improved, the original was a single application that let you gather your thoughts, throw down ideas in an unstructured way and then reorganize them in a way that makes sense.

For example you could jot down, say, five major points. These would be at the most important level, corresponding perhaps with chapters in a book. Any of these chapters or major points can be subdivided into secondary points, and the secondary points can be further divided into tertiary points. Very quickly you create branches of branches of branches.

However, you need never lose sight of the forest for the trees because at any time, you can "collapse" the minor points and extraneous details. You can always see the big picture.

Any point that has subpoints is indicated in Thinktank with a plus sign. For example, this story would be structured thus:

+ **Writing Factory**
-Habadex
-Factfinder
-Thinktank.
-Word
-Hayden Speller

The dash or minus sign indicates that at this point there are no further subdivisions. However, once you do enter further subpoints into a category, the minus sign turns into a plus sign, indicating there are further branches.

The new 512K Thinktank combines the outlining function with a stripped down word processing program. You can do word processing within the outline as the form of the story takes shape. You can also "cut and paste" facts from Factfinder into this structure.

If you're not fussy you can get by using Thinktank as your final word processor. You'll have to strip out the outline structure, leaving only the underlying text. Come printout time, however, there will be annoying blank spaces between each window of text. You would have a coherent whole, though.

Thinktank 512 includes an integrated word processor and graphics along with the idea processor itself. The simple pluses and minuses have been altered somewhat to accommodate the graphics and word processing. The updated version is a little cleaner, using solid black circles in place of a plus sign surrounded by a circle.

These circles denote the presence of word processing text or graphics that are contained within the particular outline point. By double clicking on one of these circles, one suddenly has access to a Macpaint image or to a native word processing package that is a fast stripped down version of MacWrite.

While Thinktank is an admirable outlining tool and the word processor is functional for rough writing, the printed output is not acceptable for most professional writing purposes. Usually you do not want to include the headlines and subheads that made the structure possible in the first place. You only want to include the resulting copy. While the heads can be deleted, blank spaces are left, and, worse, indentations of the paragraphs exist with each paragraph that was created in an inner subhead. The 512 Thinktank manual does not make clear the document conversion possibilities. It emphasizes that graphics can be pulled in via the scrapbook from programs like MacPaint for use in the graphics portion, but little is said about word processing output.

Transfer to Word Processing

By the time you're at the stage of combining word processing with Thinktank, you will have removed the Factfinder program. If you still need to refer to a particular collection, you can also print out Factfinder factsheets.

Once you're using Word, you're not really processing words at all. That has been done in the previous stages. By now, you're editing and tightening, doing search and replaces, setting margins and preparing the copy for the finished version that will be seen by the eyes of editors, and ultimately, of readers. Word will allow you to do the fancy things the stripped down word processors in Factfinder or Thinktank would not let you do. It permits subscripts and superscripts, for example, using sophisticated tabs and margin indentations and setting of running heads or footnotes.

To use the factory analogy, the finished product is about ready to come off the assembly line. The inspector at the end is a spelling checker. MacSpell Right works only with MacWrite, while Hayden Speller works with either MacWrite or Word. Both are limited by twenty thousand word vocabularies. While you may think you are a good speller, the programs are actually most useful for catching typos.

Sophisticated writers will be frustrated by the inadequacy of the limited vocabularies of these two programs. Before spending money, investigate to see if more appropriate forty thousand word versions have become available.

Hayden Speller is easy to learn. You just double click on the Hayden Speller icon, then open your word processing document. The spelling checker first tells you how many words are in your document, which is useful for publications that pay by the word. It also tells you how many different words are used. Typically this number is about a quarter of the final count.

Hayden Speller flags a number of words it considers to be suspect. This does not mean they are wrong, only that its limited vocabulary does not recognize what you have written. For example, product names and city names that are spelled correctly will still be flagged as suspect. A small hand with a pointing finger scrolls through the document, putting the touch on every suspected spelling culprit. A window opens up that permits you to let the word stand, or, if a mistake has been made, you can access the built in dictionary. If the checker has the word, you can click on it and it will be substituted for your incorrect version. If the checker does not have the word on file, it may still have spotted an error, in which case you can manually correct it at this stage.

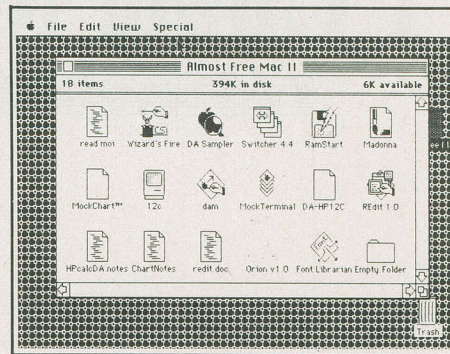
Typically, of fifty suspect words, three or so will turn out to be actual spelling mistakes, another four or five will be typographical errors, and the rest will be acceptable words the checker didn't recognize.

SN!

Almost Free Mac Software Volume II

A Macintosh is nothing more than a peculiar desk lamp without some software to drive it. Even at that, it's not a comfortable thing to try to read by . . . using it as a computer is unquestionably a preferable fate for it.

This collection of software is the best of what has been released into the public domain in the past while. It's all been thoroughly checked out, scrutinized and played with. Whether you're up for serious business applications or just meddling with fruit, some of this software will become as much a part of your Mac as the finder.



Font Librarian The font mover that comes with the Macintosh system disk is a bit of a cow. This application replaces it with a splendidly flexible, easy to use bit of software, allowing to create custom collections of fonts with unsurpassed ease.

Wizard's Fire This is a fairly lively game with some still more lively games tucked away in the desk accessories. Get the magic rays before they get you.

Desk Accessory Sampler If you check out the MacHacking article in the December edition of Computing Now!, you'll know that you can have quite a party with desk accessories. This program lets you try 'em before you install 'em.

Switcher The legendary troll to allow you to run up four applications concurrently on a 512K fat Mac. Hot off the wire from Cupertino.

RamStart This application creates a RAM disk of any size you like on a fat Mac, eliminating the music stepping motors of your drives every time you want to do something. As a side benefit, it also speeds up most software several times over.

Madonna A MacPaint picture of Madonna . . . er, not the sort that they *used* to paint.

MockChart A desk accessory to handle small charts. A superb trip for business users who think in spreadsheets.

Dam Often times a curse, in this case the desk accessory manager. Lets you set up the apple menu of your Mac the way you want it.

MockTerminal A desk accessory that lets you telecommunicate from within an application.

HP Calc A desk accessory that adds a simulated Hewlett-Packard scientific calculator to your Mac.

REdit A very slick resource editor . . . check out the MacHacking article in the December Computing Now! for some good reasons for wanting one of these things. The most fun you can have on a Mac without voiding its warrantee.

Orion This thing is worth the price of the disk all by itself. It simulates cruising around the galaxy in a faster than light spaceship. The stars go cruising by . . . with or without their names fluttering off them like celestial flags. The heavens are mapped pretty accurately, and the controls of the space ship behave just like those of any other warp drive star Chevy.

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Fine print: All of this software was obtained from public bulletin boards and is believed to be in the public domain. Some of it is freeware . . . its authors would like you to send them some money if you decide you like it. This is between you and your credit limit.

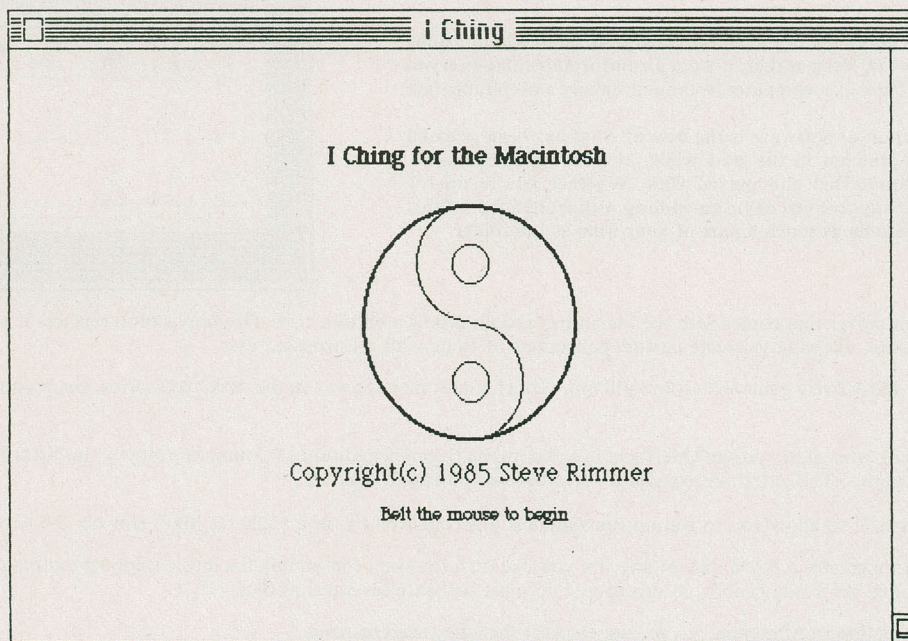
Please note that we aren't charging you anything for this software, but rather, for the cost of our downloading, sorting and assembling it and for the cost of the media and postage to get it to you.

We've tested this software thoroughly and it all appears to be working properly. Some of it, like the resource editor, will require a degree of expertise to use fully. Be prepared to experiment a bit. We are unable to assist you with adapting this software to your specific applications.

If you are unable to read the files on this disk contact us. We can jointly swear at the post office and we'll replace your disk.

This disk is provided without a finder or other system files. It will not boot. The files will have to be copied onto a bootable disk to be used.

I Ching for the Macintosh



A bit of mysticism is good for the soul and, if you're really lost
may even help you to find yours.

by Steve Rimmer

With all of the already random elements in high technology... hard disks, dealer service, documentation and so forth... one might well question whether there is any need to deliberately introduce another one. To be sure, there does seem to be a degree of dissonance between something as contemporary as a computer and the *I Ching*, probably the oldest written work extant upon the planet.

On the other hand, the graphics are kind of nice and, if you look at them for a while the hexagrams start looking a lot like binary numbers. In fact, coding the *I Ching* into BASIC is a remarkably interesting exercise in handling peculiar data structures. Far from being something which can be manipulated as text or straight numerical information, the hexagrams of the *I Ching* are a code unto themselves.

This program for the Apple Macintosh is a simulation of the process of casting the *I Ching*. In more traditional approaches to this, one used yarrow stalks or, more recently, coins. Inasmuch as the process is used to generate random patterns of six figures, each figure having two possible states, the computer can handle it fairly easily. In the normal course of throwing the *I Ching* one would look up the resulting pattern to figure out which hexagram had been thrown. The computer handles this bit too.

It would be a gross trivialization of the *I Ching* to suggest that this program embodies any real part of the body of it. Beyond simply flinging the coins around, the *I Ching* constitutes a large body of work to aid one in interpreting the hexagrams. It would have been impractical to have attempted to get this into the program... if you're curious about it, you should probably pop for a translation of the *I Ching* itself.

I found one of the ones I based this program on in Woolco on the two for dollar pile.

I Ching and Scrat ching

The table of hexagrams of the *I Ching* does not have any inherent pattern to it... at least, not one which is useful in simplifying it programmatically. As such, it is necessary to create a table with one entry for each of the hexagrams.

This is, of course, what all the data statements at the bottom of the code do.

The lines of the hexagrams can be seen... in computer terms... as being binary ones and zeros. I've assigned the *yang* a value of one and the *yin* that of zero. I've also assigned the top line the least significance in the binary number, and the bottom the most. This is actually the opposite of what it should be... however, it kept the code a bit simpler. It was hard

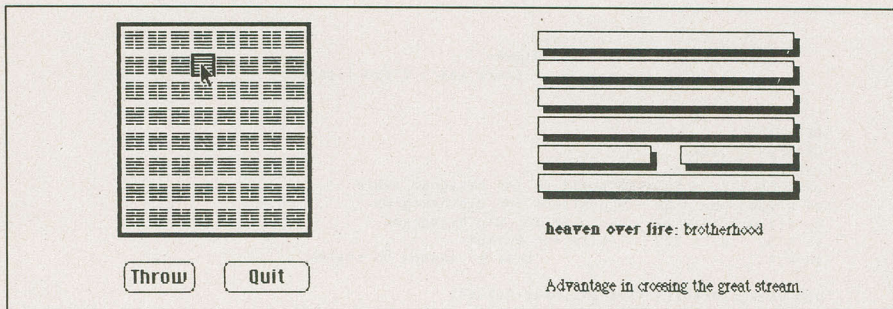
enough reading the chart from right to left.

The hexagram chart, by the way, is shown on the Mac's screen from right to left, which is the proper Chinese representation. The first hexagram, then, is in the north east corner.

In devising a number which represents the pattern of each hexagram, it was easier to figure them out in hexadecimal. The lower four lines become the rightmost digit, with the remaining two being the leftmost one... this having a value of between zero and three. This is actually an artificial division based on Microsoft BASIC's having the facilities to manipulate hex numbers, as opposed to pairs of trigrams. In any case, the numbers are converted to patterns of *yangs* and *yins*, so their internal representation doesn't really matter.

The variable *s* holds a pointer to the hexagram the program is currently concerned with. The *CrackHex* subroutine will generate a pattern of trues and falses in the array *bar()* corresponding to the pattern of *yangs* and *yins* coded into the hexagram number in question. By going through all this, the program allows us to represent the six pieces of information in each hexagram in one variable each, unpacking it when we need it.

The first important thing that the program does is to generate the table of hexagrams in the *HexChart* routine. This is a set



of three nested FOR NEXT loops, one for each pair of directions on the screen and a third, innermost one to generate each hexagram. Notice that the lines themselves are done using Macintosh QuickDraw calls rather than BASIC LINE instructions. These are nominally quicker... and a bit less dense to type in, worth the effort allowing for the complex calculations going down in these lines as it is.

The trickiest part of the program is probably *MouseHex*, which is the main dispatch routine. It allows one to click on one of the hexagrams in the chart to see what it says. The program has to be able to determine whether the mouse has been clicked within the box that surrounds the table of hexagrams and, if it has, which hexagram has been selected. It indicates that a hexagram has been selected by inverting it... yet another QuickDraw call... and then waits for the mouse to be released to invert it again, returning it to its normal appearance.

Having selected a hexagram the program will proceed to draw a larger version of it on the right side of the screen and offer what interpretation it can. The few words it has to say about each one are pretty basic stuff... you should check out the *I Ching* itself to find out what the hexagrams are supposed to mean.

The more fundamental thing for the program to do when it gets to interpreting a hexagram is to find out what its component trigrams are. This is handled by the *ShowTrigram* and *FindTrigram* subroutines. The former creates *q\$* from the top and bottom half of the array *bar()*. This string consists of three bytes of "1" or "0", representing the patterns of *yangs* and *yins*.

The *FindTrigram* adds a space to the end of *q\$* and searches for it in *tg\$*, which holds representations of all of the trigram permutations. The position of *q\$* in *tg\$*

divided by the length of *q\$*... four... will be a pointer into the array *trigram\$*, which holds the names of the trigrams.

The other bits of interpretation, the proper attribute of each hexagram and my synopsis of their meanings, live in sixty-four element arrays which are pointed to by *s*.

The array *meaning()* is handled a bit strangely. Normally, all of the characters in its strings are lower case. In this case, the program will tack the phrase "There is advantage in " to the beginning of the string and display it. However, if it sees a capital letter at the beginning it will turn it into a small letter and use the phrase "There is disadvantage in..."

The case of ASCII text serves as a useful flag if it isn't important to the text itself.

The two buttons that the program displays... *throw* and *quit*... are fairly simple. The latter pretty well explains itself. If you zap the *throw* button the program will randomly leap around the table of hexagrams and select one. It's interesting to watch, and is, in effect, what the program is all about.

Sage For Hire

Throwing the *Ching* is probably no worse a way of deciding what to do than holding meetings, listening to the radio or flipping a coin. It's considerably more interesting than horoscopes, and certainly no less reliable than tarot cards or tea leaves. It's easily better than a phrenologist with cold fingers.

More to the point, of course, it involves very interesting graphics which the Macintosh handles quite well. This may be a clue in the development of truly effective Mac applications. One should come up with a neat looking screen first... and then work out a program to use it.

An Introduction to the I Ching

Whether or not one wishes to take the *I Ching* seriously is, of course, up to one's self. I confess to finding the most reassuring divinations in the gas gauge of my truck, but the *I Ching* is extremely interesting none the less. It's fundamentally weird to read something that was written over five thousand years ago.

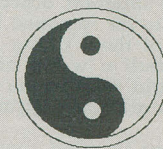
According to the sorts of things one finds in prefaces to the *I Ching*... even in the two for a dollar editions... people have been known to spend years studying it. You may not want to get this deeply into it just now, however a bit of background to it will be useful in understanding what this program is intended to do.

The *I Ching* itself is a book which was written down in what is now China, probably about fifty-two hundred years ago. Bear in mind that while the authors of the *I Ching* were busy writing it the rest of the planet was still largely in the trees.

The basis of the *I Ching* is in the interpretation of a series of sixty-four hexagrams. In a sense it's a book of divination, or prophesy... one casts a series of coins or sticks to generate a hexagram and checks out what it's supposed to foretell. This is a ghastly oversimplification, of course... it's beyond the purview of this sidebar to get into all that the *I Ching* is intended to represent.

A hexagram is a series of six horizontal lines. Each line can be either a *yang* line or a *yin* line. A *yang* is shown as a solid line, while a *yin* is broken. The *yang* is said to be strong, heaven, hard, the great brightness and male. The *yin* is, on the other hand, weak, earth, soft, the great obscurity and female. This sounds extremely sexist, to be sure... they likely saw these things differently fifty centuries ago.

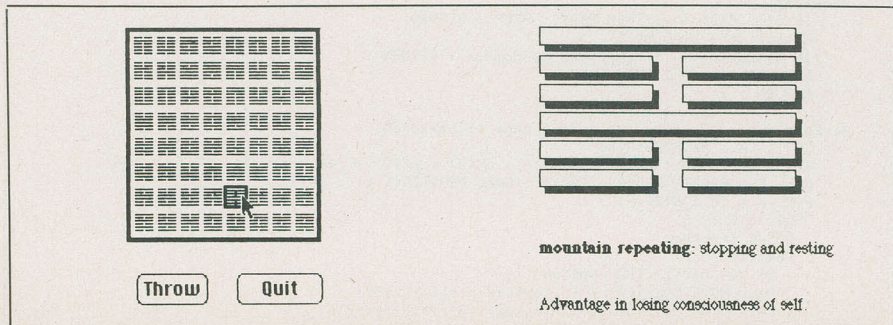
In reading the *I Ching*, however, one begins to see that the attributes of the *yang* aren't necessarily seen as being good, nor those of the *yin* particularly undesirable. The *yang* and *yin* are often represented as a circle with an S shaped line through its centre. The white half is the *yang*... the great brightness... and the dark half the *yin*... the great obscurity. James Legge, who is responsible for the a large part of what now exists as a Western translation of the *I Ching*, says of the meaning of this symbol "the connection of the two is necessary to the production of one substantial thing".



Yin



Yang

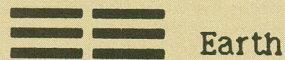


I Ching

The yang and yin lines are initially arranged in trigrams... collections of three lines stacked vertically. There are eight trigrams,



Heaven



Earth



Marsh



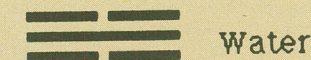
Fire



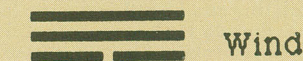
Thunder



Mountain



Water



Wind

The trigrams are arranged in groups of two, one over another, to form hexagrams. Each hexagram is described first as the sum of its trigrams, such as "heaven over mountain" or "heaven repeating", the latter being a hexagram made up of two identical trigrams. Secondly, each hexagram is given a unique human attribute, such as "strife" or "seclusion". Finally, it is interpreted. Various editions of the *I Ching* offer interpretations and commentaries on the hexagrams to varying degrees. The two for a dollar edition ran to three or four pages per hexagram.

Consulting the *I Ching* is an exercise in interpretation. As in all forms of divination, the symbols are a bit obtuse to begin with... no decent prediction of the shape of destiny ever gives you more than a silhouette. It would take all the fun out of it. To further add to this inherent obscurity, our own lives are quite far removed from those of the authors of the *I Ching*, five thousand years and half a world away. The insight which might exist in the hexagrams often requires a bit of digging to unearth.

It may help to bear in mind that the language in which the *I Ching* was written is fundamentally different from our own. It is, first of all, symbolic rather than phonetic, with each character being a complete concept. They have a lot of characters. It's also interesting to note that, unlike our own language, which has changed to the point of its earlier forms being incomprehensible to most of us, a contemporary person reading Chinese would be able to read the *I Ching* exactly as it was written.

CN!

-Steve Rimmer

I Ching for the Macintosh
Copyright (c) 1985 Steve Rimmer
Dedicated to the memory of Bruce Lee's Zippo lighter

```

DEFINT A-Z
CentreX = 512/2
CentreY = 275/2
ox = 50 : oy = 50 'position for hexagram table
bx = 250 : by = 50 'position for big hexagram
hx = 180 : hy = 12 'size for big hexagrams
sx = 50 : sy = 225 'size for buttons
sh = 4 'size of shadow on stalks

DIM hexagram(64),title$(64),meaning$(64)
false = 0 : true = NOT false
tg$ = "111 000 011 101 001 100 010 110 "
CLS

GOSUB HiThere 'Say hello, grasshopper
GOSUB SetUp 'Do initial setup
GOSUB SetButtons 'setup the buttons
GOSUB HexChart 'Show all the hexagrams
ON Dialog GOSUB Handler
Dialog ON
WHILE true 'avoid gotos at all costs
  GOSUB MouseHex 'handle the mouse
WEND
END

CrackHex: 'crack hexagram(s) into bar(1-6)
FOR c=1 TO 6
  d = INT(hexagram(s)/(2^(c-1)))
  IF (INT (d/2)) * 2 = d THEN bar(c) = false ELSE bar(c) = true
NEXT c
RETURN

RandomHex:
ThrowButton = false : QuitButton = false : GOSUB SetButtons
FOR x=1 TO 10 + INT(RND(1)*24)
  a = INT(RND(1)*8) : b = INT(RND(1)*8)
  r%(0) = oy + (b * 16) : r%(1) = ox + (a * 16) - 2
  r%(2) = r%(0) + 15 : r%(3) = r%(1) + 17
  CALL INVERTRECT(VARPTR(r%(0)))
  FOR y=1 TO 100 + (96 * x) : NEXT y
  CALL INVERTRECT(VARPTR(r%(0)))
NEXT x
a = INT(RND(1)*8) : b = INT(RND(1)*8) : s = (8-a) + (8*b) : GOSUB BigHex
ThrowButton = true : QuitButton = true : GOSUB SetButtons
RETURN

SetButtons:
BUTTON 1,ABS(ThrowButton),"Throw",(sx,sy)-(sx+50,sy+20)
BUTTON 2,ABS(QuitButton),"Quit",(sx+70,sy)-(sx+130,sy+20)
RETURN

MouseHex: 'return the number of the hexagram selected in s

ThrowButton = true : QuitButton = true : GOSUB SetButtons
WHILE MOUSE(0) : WEND
WHILE NOT MOUSE(0) : WEND
mx = MOUSE(1) : my = MOUSE(2)
IF mx < ox OR mx > ox + 128 THEN BadMouse
IF my < oy OR my > oy + 128 THEN BadMouse
a = INT((mx - ox)/16) : b = INT((my - oy)/16)
r%(0) = oy + (b * 16) : r%(1) = ox + (a * 16) - 2
r%(2) = r%(0) + 15 : r%(3) = r%(1) + 17
CALL INVERTRECT(VARPTR(r%(0)))
WHILE MOUSE(0) : WEND
CALL INVERTRECT(VARPTR(r%(0)))
s = (8-a) + (8*b) : GOSUB BigHex
RETURN

BadMouse: 'handle a click outside hex chart
BEEP
RETURN

Handler:
IF Dialog(0) <> 1 THEN BEEP : BEEP : RETURN
HitButton = Dialog(1)
IF HitButton = 1 THEN GOSUB RandomHex : RETURN
IF HitButton = 2 THEN END
RETURN

HexChart: 'show the entire page of hexagrams
CLS : CALL PENSIZE(3,3)
r%(0) = oy - 4 : r%(1) = ox - 6 : r%(2) = r%(0) + 136 : r%(3) = r%(1) + 136
CALL FRAMERECT(VARPTR(r%(0))) : CALL PENSIZE(1,1) : s=1
FOR y= 8 TO 1 STEP -1
  FOR x= 1 TO 8
    GOSUB CrackHex
    FOR z=1 TO 6
      IF NOT bar(z) THEN NotYang
      CALL MOVETO(ox+(8-x)*16,(oy+((8-y)*16)+(z*2)))
      CALL LINETO(12+ox+(8-x)*16,(oy+((8-y)*16)+(z*2)))
    
```


I Ching

NotYang:

```
IF bar(z) THEN NotYin
CALL MOVETO(ox+(8-x)*16,(oy+((8-y)*16)+(z*2)))
CALL LINETO(5+ox+(8-x)*16,(oy+((8-y)*16)+(z*2)))
CALL MOVETO(7+ox+(8-x)*16,(oy+((8-y)*16)+(z*2)))
CALL LINETO(12+ox+(8-x)*16,(oy+((8-y)*16)+(z*2)))
```

NotYin:

```
NEXT z
s = s + 1
NEXT x
NEXT y
RETURN
```

SetUp:

```
'set up initial arrays and stuff
FOR x=1 TO 64 : READ a$: hexagram(x) = VAL(a$)
READ title$(x), meaning$(x) : NEXT
FOR x=1 TO 8 : READ trigram$(x) : NEXT x
RETURN
```

BigHex:

```
'draw a big hexagram pointed to by s
r%(0) = oy + (b * 16) : r%(1) = ox + (a * 16) - 2
r%(2) = r%(0) + 15 : r%(3) = r%(1) + 17
CALL INVERTRECT(VARPTR(r%(0)))
```

```
ThrowButton = false : QuitButton = false : GOSUB SetButtons
IF s < 1 OR s > 64 THEN NoHex
r%(0) = 1 : r%(1) = oy + 136 : r%(2) = 2 * CentreY : r%(3) = 2 * CentreX
CALL ERASERECT(VARPTR(r%(0)))
GOSUB CrackHex 'get the hexagram
FOR x = 1 TO 6
  yy = bx : yy = by + ((x-1) * (hy/2))
  IF bar(x) THEN GOSUB Yang ELSE GOSUB Yin
NEXT x
GOSUB ShowTrigram 'get the trigram
CALL MOVETO(bx,by+((hy+(hy/2))*8))
CALL TEXTFACE(1) : CALL TEXTSIZE(10) : PRINT a$ " : ";
CALL TEXTFACE(0) : CALL TEXTSIZE(10) : PRINT title$(s)
CALL MOVETO(bx,by+((hy+(hy/2))*10))
t$ = LEFT$(meaning$(s),1)
IF t$ = UCASE$(t$) THEN flag = true ELSE flag = false
t$ = meaning$(s)
IF flag THEN MID$(t$,1,1) = CHR$(ASC(MID$(t$,1,1))+32)
IF flag THEN PRINT "Disadvantage in "; ELSE PRINT "Advantage in ";
PRINT t$ "
```

NoHex:

```
r%(0) = oy + (b * 16) : r%(1) = ox + (a * 16) - 2
r%(2) = r%(0) + 15 : r%(3) = r%(1) + 17
CALL INVERTRECT(VARPTR(r%(0)))
RETURN
```

ShowTrigram: 'returns a\$ with trigram interpretation of s

```
GOSUB CrackHex : q$ = ""
FOR x=1 TO 3 : IF bar(x) THEN q$ = q$ + "1" ELSE q$ = q$ + "0"
NEXT x
GOSUB FindTrigram : top$ = a$ : q$ = ""
FOR x=4 TO 6 : IF bar(x) THEN q$ = q$ + "1" ELSE q$ = q$ + "0"
NEXT x
GOSUB FindTrigram
bottom$ = a$
IF top$=bottom$ THEN a$=top$+" repeating" ELSE a$=top$+" over "+bottom$
RETURN
```

FindTrigram:

```
q$ = q$ + " " : a$ = trigram$(INSTR(tg$,q$)/4)+1)
RETURN
```

Yang:

```
'draw a yang at xx,yy
CALL PENSIZE(1,1)
r%(0) = yy : r%(1) = xx : r%(2) = yy+hy : r%(3) = xx + hx
CALL FRAMERECT(VARPTR(r%(0))) : CALL PENSIZE(sh,sh)
CALL MOVETO(r%(1)+sh,r%(2)) : CALL LINETO(r%(3),r%(2))
CALL LINETO(r%(3),r%(0)+sh) : CALL PENSIZE(1,1)
RETURN
```

Yin:

```
'draw a yin at xx,yy
CALL PENSIZE(1,1)
r%(0) = yy : r%(1) = xx : r%(2) = yy+hy : r%(3) = xx + (hx/2) -10
CALL FRAMERECT(VARPTR(r%(0))) : CALL PENSIZE(sh,sh)
CALL MOVETO(r%(1)+sh,r%(2)) : CALL LINETO(r%(3),r%(2))
CALL LINETO(r%(3),r%(0)+sh) : CALL PENSIZE(1,1)
r%(0) = yy : r%(1) = xx + (hx/2)+10 : r%(2) = yy+hy : r%(3) = xx + hx
CALL FRAMERECT(VARPTR(r%(0))) : CALL PENSIZE(sh,sh)
CALL MOVETO(r%(1)+sh,r%(2)) : CALL LINETO(r%(3),r%(2))
CALL LINETO(r%(3),r%(0)+sh) : CALL PENSIZE(1,1)
RETURN
```

HiThere:

```
'Do opening graphic
CALL PENSIZE(2,2)
r%(0) = CentreY - 60 : r%(1) = CentreX - 60
r%(2) = CentreY + 60 : r%(3) = CentreX + 60
CALL FRAMEVAL(VARPTR(r%(0)))
CALL PENSIZE(1,1)
r%(0) = CentreY : r%(1) = CentreX - 30
```

```
r%(2) = CentreY + 60 : r%(3) = CentreX + 30
CALL FRAMEARC(VARPTR(r%(0)),0,180)
r%(0) = CentreY - 60 : r%(1) = CentreX - 30
r%(2) = CentreY : r%(3) = CentreX + 30
CALL FRAMEARC(VARPTR(r%(0)),180,180)
CIRCLE (CentreX,CentreY+30),10
CIRCLE (CentreX,CentreY-30),10
CALL TEXTFACE(33)
CALL MOVETO(CentreX-80,CentreY-80)
PRINT "I Ching for the Macintosh"
CALL TEXTFACE(0)
CALL MOVETO(CentreX-100,CentreY+80)
PRINT "Copyright(c) 1985 Steve Rimmer"
CALL TEXTSIZE(9)
CALL MOVETO(CentreX-50,CentreY+100)
PRINT "Belt the mouse to begin"
WHILE NOT MOUSE(0) : WEND
RETURN
```

This is the data for the hexagrams... in hex, of course

```
DATA &h3F,heaven, all things
DATA &h00,earth, getting friends in the southwest
DATA &h22,struggle, being correct and firm
DATA &h11,youth, being correct and firm
DATA &h3a,waiting, crossing the great stream
DATA &h17, strife, seeing the great man
DATA &h10,hosts, a leader of age and experience
DATA &h02,union, virtue which is great & unintermitting

DATA &h3b,small restaurant, strength and flexibility
DATA &h37,walk softly, keeping place
DATA &h38,the waxing, the little gone & the great coming
DATA &h07,the waning, the great gone & the little coming
DATA &h2f,brotherhood, crossing the great stream
DATA &h3d,great havings, abundance
DATA &h08,humility, humbleness
DATA &h04,harmony, setting up feudal princes

DATA &h26,following, being firm and correct
DATA &h19,work to be done, crossing the great stream
DATA &h30,authority comes, being firm and correct
DATA &h03,manifesting and contemplating, sincerity
DATA &h25,union by gnawing, using legal constraints
DATA &h29,adornment, ornament
DATA &h01,overthrow, Movement in any direction
DATA &h20,returning, movement in any direction

DATA &h27,sincerity, being firm and correct
DATA &h39,great accumulation, crossing the great stream
DATA &h21,nourishment, seeking the proper things to nourish
DATA &h2e,greatness and difficulty, extraordinary times
DATA &h12,danger, sincerity
DATA &h2d,double brightness, firmness correctness and docility
DATA &h0e,mutual influence, marrying a young lady
DATA &h1c,perseverance, Movement in any direction

DATA &h0f,seclusion, Movement in any direction
DATA &h3c,abundant strength, being firm and correct
DATA &h05,advancing, securing the tranquility of subjects
DATA &h28,intelligence repressed, realizing difficulty
DATA &h2d,members of a family, a firm and correct wife
DATA &h35,alienation, diversity
DATA &h0c,difficulty, the southwest
DATA &h14,relief, the southwest and in returning

DATA &h31,payment due, sincerity
DATA &h23,gifts received, crossing the great stream
DATA &h3e,removal, exhibition of guilt in the royal court
DATA &h1f,encounter, Marrying a strong willed woman
DATA &h06,gathering, meeting the great man
DATA &h18,advance, in the south
DATA &h16,restrictions, Making speeches
DATA &h1a,wells, permanence in the face of change

DATA &h2e,change, being firm and correct
DATA &h1d,cauldron, flexible obedience
DATA &h24,moving forward, sincerity
DATA &h09,stopping and resting, losing consciousness of self
DATA &h0b,gradual progress, marrying a young lady
DATA &h34,going home, marrying away a young sister
DATA &h2c,abundant prosperity, Fear of change
DATA &h0d,travelling stranger, being firm and correct

DATA &h1b,the penetrating, seeing the great man
DATA &h36,pleasure, firm correctness
DATA &h13,dispersion, crossing the great stream
DATA &h32,just regulations, recognizing authority in its place
DATA &h33,inmost sincerity, crossing the great stream
DATA &h0c,small excesses, being firm and correct
DATA &h2a,successful accomplishment, order
DATA &h15,more to do, Any way
```

DATA heaven, earth, marsh, fire, thunder, mountain, water, wind

The External PC



Being able to manipulate external assembly language procedures can avail you of enormous programming power... both for low level code and BASIC.

by Steve Rimmer

Writing assembly language programs for the IBM PC is a task at best... the MASM macro assembler is oftentimes a bit of pig. It's slow as molasses in January... in liquid nitrogen.

On the other hand, the macro assembler does have a number of facilities which offset this speed problem to a surprising degree if they're used right. However, the documentation for these things is obscure to the point of non-existence and, unless you're just naturally tight with assemblers you might well have missed them all together.

This month we are going to look at one of these, to wit, the way that MASM and some related things handle external symbols. This sounds deadily dull, to be sure, and esoteric enough not to be useful for anyone not trying to re-write the universe for the 8088. However, by implementing it properly you can really shift program development into overdrive and do a few things that just aren't usually practical.

Among them is the graceful art of handling machine language routines from BASIC.

Public Schools

If you've ever had a shot at developing a fairly large program, you'll be familiar with the cyclical process of writing code for MASM. You enter it as text, save the file, leave the editor, boot the assembler... and go for lunch. The assembler sucks in your file and leans back for a good long think. Five minute assembles aren't all that uncommon for even moderate size programs.

It may have occurred to you that on subsequent assembles MASM is really assembling most of the same code over and over again as you fiddle with the bit that you're working on. This is supremely frustrating, to be sure.

By getting into external symbols you are effectively allowing MASM to assemble the code you know is working... once... and thereafter only assemble what you are still developing. The two are subsequently married into an object file by the linker. You probably figured that thing was too big for what it was doing.

If you set things up right EXE files created from two or more object modules can be EXE2BIN'd into COM files, so there is effectively no difference between using this approach and writing one great long source file. However, it can cut one's wait for the assembler down to almost nothing... well worth the effort.

In addition, you can create files of useful routines which can hang around in object module form. Thereafter, you can just link them into whatever you write, giving you a huge library of low level functions as soon as you start writing something.

Beyond all this, you can link object modules into things other than assembly programs, an obvious example being BASIC code. We'll look at how that's done in a moment.

The External PC

Stuff and Nonsense

I have a file called STUFF.ASM, which holds the ongoing collection of low level routines that I use in developing assembly language programs. This is a routine out of STUFF, with the trap-pings of the file.

CGROUP	GROUP	CODEX
CODEX	SEGMENT	PARA PUBLIC 'CODE'
CONSOLE	PROC	FAR
	ASSUME	CS:CGROUP, DS:CGROUP,
		ES:CGROUP
	PUBLIC	PUTCH, ILPRT
MAIN	PROC	NEAR
ILPRT:	POP	BX
ILPLP:	MOV	AL,[BX]
	CMP	AL,0
	JE	ILPRET
	CALL	PUTCH
	INC	BX
ILPRET:	JMP	ILPLP
	INC	BX
	PUSH	BX
	RET	
PUTCH:	PUSH	DX
	PUSH	CX
	PUSH	BX
	PUSH	AX
	MOV	AH,15
	INT	10H
	POP	AX
	MOV	AH,14
	INT	10H
	POP	BX
	POP	CX
	POP	DX
	RET	
MAIN	ENDP	
CONSOLE	ENDP	
CODEX	ENDS	
	END	

These routines are pretty simple... PUTCH prints the character in AL in the screen and ILPRT is an inline string printer. It's used like this:

```
CALL ILPRT
DB 'There once was a hermit named Dave',0
```

It prints the string until it reaches the null and then executes the next instruction in the program.

What is important about these is that they are external procedures. They live as a separate file to the code which calls them. They know this because they have been defined as being public, which indicates that the assembler can call them either from within this file or from another file that this one will be linked to.

This file, as you'll notice, has no origin. It will never be linked so as to make it executable. It's called a relocatable file, because it will only get assembled to the point of being a relocatable object module.

Understanding these things is important to being able to fathom exactly how all this stuff is supposed to work. When MASM gets through with this file any absolute addresses, such as the call to PUTCH from ILPRT, will be replaced with markers. The markers will tell the assembler how far... in relative terms... the address is from the beginning of the file. The address of the marker will be added to a table to allow the linker to find it later on.

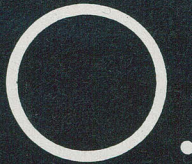
This file would be linked to the main file that will be using these routines by doing

```
LINK MAINCODE+STUFF
```

which would produce an executable program called MAINCODE.EXE.

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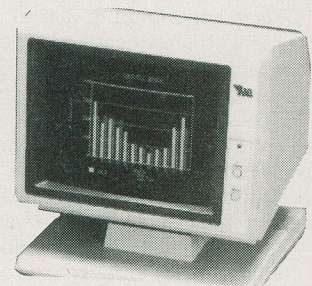


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The External PC

Now, you might well ask how the assembler knows of the existence of this file at assembly time. Calling ILPRT from a file which doesn't have it sounds like it should produce an error. In fact, it will unless the assembler is specifically instructed to hold off complaining about the lack of an ILPRT to call. This is done by defining it as an external symbol.

Here's a sample program that would call the external procedures in my STUFF file of a few minutes ago.

CGROUP CODEX CONSOLE ASSUME	GROUP SEGMENT PROC	CODEX PARA PUBLIC 'CODE' FAR CS:CGROUP, DS:CGROUP, ES:CGROUP
MAIN	EXTRN PROC CALL DB DB ENDP ENDP ENDS END	ILPRT:NEAR NEAR ILPRT 'But soft... what brick through yonder ' 'window breaks?'.0
MAIN CONSOLE CODEX		

The EXTRN declaration at the top tells the assembler not to generate an error upon not finding ILPRT... in fact, it would throw an error if it did... but, rather, to pass the call to ILPRT as a relocatable call in the object module it's creating so the linker can make sense of it later on.

Notice that the file contains no direct reference to STUFF.ASM. The assembler doesn't even know that there really is a file with the external procedures it's been led to believe in. If something with an address for ILPRT isn't linked to this one the linker will complain on behalf of the assembler later on, calling this line an "unresolved external".

Far, Far Away

I find that, for the sort of stuff I write, COM files are preferable to EXE files. They're shorter, a bit easier to debug and behave in more predictable ways. As such, I've set up this stuff to assemble down into a COM file.

A COM file has to fit into one memory segment by its definition. As such, all the jumps and calls in the thing must be near ones... two byte addresses, as opposed to four, with the segment implicit rather than specified. This means, for example, that if the code segment for my program were 0898H and ILPRT wound up at location 0121H when the linker finally cooled down, my call to ILPRT would be CALL 0121, not CALL 0898:0121.

This is important because of a really peculiar situation that can arise if you mix near and far calls without watching yourself.

Because the routines in my STUFF file are all defined into a single procedure... sloppy but convenient... they could be near or far calls as seen by the file with their external calling procedures. However, if one of them calls another one, as ILPRT calls PUTCH, it will be a near call. This is nasty, because the RET at the end of PUTCH, were it to be a far call, would be a far RET, sucking four bytes off the stack instead of two.

Not surprisingly, it would hang like a heathen.

It's convenient to make the routines in STUFF both callable internally and externally and, as such, one must make sure that all the procedure types match. As I mentioned above, this is easy for COM files... they all pretty well have to be near. If you are writing large or particularly freaky code, such that it turns out as EXE files, you'll have to keep an eye on this. It can lead to some really hairy problems.

There are a number of other useful things to note about this stuff. The first one is that you can also reference data storage areas and other memory locations this way... just define their symbols as external as if they were routines. As should be obvious, the assembler doesn't care what's at the address in question... just so long as there's a symbol attached to it.

The other important bit is that it's allowable to have external

declarations in all the object modules one is linking together. You can, for example, have two files in which each has external references to the other. It sounds like it should give the assembler a splitting headache but, in fact, it works quite painlessly.

In developing large chunks of code I usually move everything that has been tested and is known to be working over to the STUFF file and declare it external. As such, the program I'm working on is rarely bigger than six or eight K, although the STUFF file gets constantly larger.

The STUFF file need only be assembled when you change something in it. Even when you link it to your main code module the original STUFF.OBJ file will still exist on the disk. As such, you can change something in your program, reassemble the program and then just relink it to STUFF... which is a lot faster than reassembling everything in a long STUFF file.

Beyond BASIC

The Microsoft BASIC that comes with MS-DOS is a wonderful language... for some things. However, it isn't uncommon to find something that it can't handle, especially when one is developing large, complex applications with it. In order to add things to BASIC one has to know how to link external machine language procedures to it.

As you might have already figured, this is essentially the same process as linking these things to machine language routines.

We're actually going to look at linking an assembly language routine to a compiled BASIC program. The program is

```
10 B$ = "Please sir, not the whipped cream..."
20 CALL SNUFF(B$)
```

and, when it's linked to the code in listing one it will print B\$ on the screen considerably faster than BASIC could have.

In fact, there are some decided limitations to this simple example. The external print routine has been stripped down a lot to make it a manageable example. It will print whatever it's given on the tenth line of the screen... in green characters. It ignores both LOCATE and COLOR commands from BASIC. It also ignores any control codes in BASIC, printing these as peculiar symbols.

One could make it into a proper screen handler if one wanted to. However, it would get a lot longer.

Actually, having external procedures in BASIC isn't that hard. Passing data to and from these procedures is one of the weirdest things you'll ever encounter. This is further complicated by the BASIC interpreter handling some things a bit differently from the way in which the compiler, BASCOM, does them.

There are a number of things that one must do in writing an assembler subroutine... this example shows the form fairly clearly. The routine must know how many arguments will be passed to it... B\$ is the argument in this example, but there could have been several variables used if there'd been a need for them. For practical reasons it must know what the variables will be. In this case, we've used a string... but one could pass numerical variables as well. Finally, the routine must preserve the segment registers and the base pointer.

A string under BASCOM exists in memory in two parts, called the *descriptor* and the *data*. The descriptor tells us how long the string is and where its data lives. If we say CALL SNUFF(B\$) what actually gets passed to the SNUFF routine is the address of the descriptor of B\$.

Machine language routines can play celestial mumbly peg with a string's data, altering it to one's heart's content, but fire and damnation will spew forth if the descriptor is altered.

One of the unpleasant bits about using external machine language calls is that the descriptor for a string varies between the interpreter and the compiler. Ignoring the interpreter for a moment, the compiler version is of the form

```
DW STRING_LENGTH
DW DATA_ADDRESS
```



```

; TEST VERSION OF PRINT
PUBLIC SNUFF
CODE    segment byte public 'code'
DATA    segment byte public 'rdata'
DATA    ends
DCGROUP GROUP DATA
        assume ds:DCGROUP,es:DCGROUP
        assume cs:code
PUBLICS  PROC    FAR
SNUFF:   PUSH    BP                ;FUDGE THE STACK
        MOV     BP,SP
        ADD     BP,(2 * 1) + 4      ;POINT TO ARGUMENT
;
;          NUMBER OF ARGUMENTS
        PUSH    DS
        PUSH    ES
        PUSH    SS                ;SAVE IRRITABLE REGISTERS
        MOV     BX,[BP]           ;GET POINTER INTO ARGUMENT
        MOV     CX,[BX]           ;GET LENGTH OF STRING
        INC     BX
        INC     BX
        MOV     SI,[BX]           ;GET POINTER TO STRING
        MOV     AX,0B500H         ;POINT TO SCREEN
        MOV     ES,AX             ;IN EXTRA SEGMENT
        MOV     AH,2              ;GREEN CHARACTERS (WHY NOT...)
        MOV     DI,40 * 10        ;TENTH LINE
        MOV     AL,DS:[SI]        ;GET A BYTE
        MOV     ES:[DI],AX        ;PRINT IT
        INC     SI                ;MOVE UP ONE BYTE IN STRING
        ADD     DI,2              ;AND ONE WORD ON SCREEN
        LOOP    MAIN_LOOP
        POP     SS
        POP     ES
        POP     DS
        POP     BP                ;RESTORE IRRITABLE REGISTERS
        RET     2                 ;RET (2 * NUMBER OF ARGUMENTS)
PUBLICS  ENDP
CODE     ENDS
END

```

The machine language subroutine to print strings to the screen.

The last bit of weirdness is the actual mechanism by which the string descriptor address is passed to our routine. It's a party. When control is passed to the machine language routine the ad-

dress of the descriptor will be four bytes above the current stack pointer. This is highly strange, to be sure. The first thing that this code does, then, is to figure out where the stack pointer is and fudge its way back to find the pointer to the string descriptor. It winds up in BX. Getting the word pointed to by BX... into CX... gives us the string length while the word at BX+2... into SI... gives us the first byte of the string.

The rest is pretty straight up code. However, the final return instruction is also a bit special. It is of the form

RET n

where *n* is two times the number of parameters passed to the routine.

This routine would be assembled with MASM, as STUFF was a while back, and linked into a BASCOM'd BASIC program just as we did with the assembly language module. The linker sorts everything out.

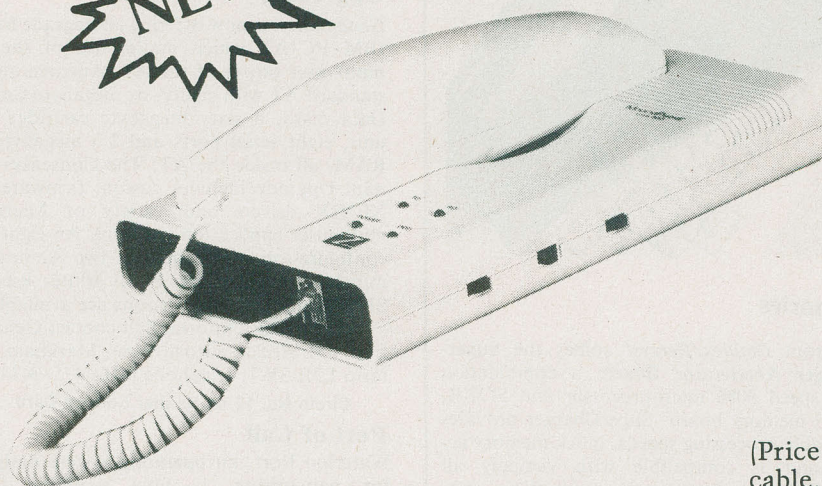
With a Rose

Using external procedures is a really powerful facility in a number of areas. It lets you develop code a lot faster... and, as we've seen, it lets you play around with BASIC's head space, certainly a valid programming tool.

In approaching programming tasks with this facility in your pocket you can get some very tight code together, using the best of both worlds as you see fit. The routines you link together don't have to be trivial... they can actually be fairly huge. You can, for example, write a large assembly language application and hang it on a small BASIC program that takes care of the cosmetic stuff. By comparison, sending all the strings to be printed in a program through one subroutine, and then replacing the subroutine with a machine language routine like this one when you go to compile it can avail one's applications of blinding speed. **CN!**

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Continued from page 7

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For further information contact your local computer supplies dealer. Dealer enquiries are welcomed at Micropro, 235 Yorkland Avenue, Suite 300, Willowdale, Ontario M2J 4Y8, telephone (416) 494-7155.

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● **Polygon Associates** have announced enhancements to two of their products. Full 132 column onscreen display will now be supported by the **poly-COM/220** software, using the Tseng Lab's UltraPak board, and the **poly-COM/240** software will support the IBM Enhanced Graphics Adapter to provide increased resolution and colour capability. Both enhancements have been integrated in each product, and are available to existing customers free of charge.

Contact Mary Krummenacher, Polygon Associates, 1024 Executive Parkway, St. Louis, Missouri 63141, telephone (314) 576-7709.

Utilities

● **Financial Dynamics** recently announced the availability of two new programming utilities.

The **dBASE III Utilities** allow development of complete, customized, transaction-based modules using such features as a menu system, data maintenance and archival routines and dynamic help routines.

The **Pascal Utilities** allow the creation of "Lotus like" menus complete with sub-menus, a descriptive message line and context sensitive help, and include date and time math and several formatting routines.

Retailing at around fifty dollars American each, these packages will run on any computer that runs dBASE III or Turbo Pascal, and will be available from Financial Dynamics, P.O. Box 10898B, Arlington, Virginia 22210, telephone (703) 524-0687.

● A new **full C compiler** is available for the IBM and compatibles from **Datalight**. Implementing the full UNIX System 5 C language, Datalight C Compiler features 8087 and software floating support, a make program, MS-DOS object files compatibility, highly optimized code, strong type-checking and full library/start-up source code.

Source licenses and support contracts will also be available for Datalight C, which will

retail for sixty dollars American. Contact Datalight at 11557-8th Avenue North East, Seattle, Washington 98125, telephone (206) 367-1803.

● The latest in the WATFOR family of **FORTRAN compilers**, WATFOR-77 has been released for the IBM PC, and supports the full FORTRAN 77 language standard. Greatly reducing the program-development cycle, this compiler emphasizes fast compilation and good diagnostics, and is available for a one-time license fee of \$295 from **WATCOM Products**, 415 Phillip Street, Waterloo, Ontario N2L 3X2, telephone (519) 886-3700.

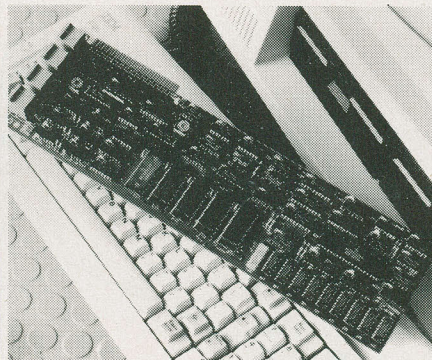
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Connections

A plug in card for personal computers which enables users to communicate simultaneously with up to four different host computers or online services, has been announced by **TIL Systems**. The XPERT PC Card allows IBM PCs or compatibles to **interact with different systems** through X.25 packet switched data networks and provides two PAD ports for ASCII devices, file transfer capabilities and a printer port.

Retailing for around two thousand dollars Canadian, XPERT Cards will be available through major computer stores. Dealers and distributors please contact TIL Systems Limited, 60 Yonge Street, Suite 1100, Toronto, Ontario M5E 1H5, telephone (416) 869-1157.

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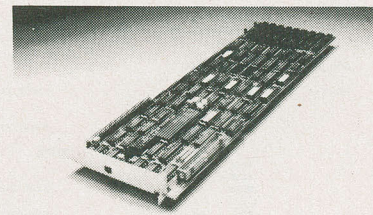


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● From **Emulex/Persyst** comes the **Super-Charger Accelerator Board**, a combination high speed 8086 microprocessor and 512KB, 16-bit memory board. SuperCharger provides selectable processing speeds, quick memory access and is compatible with virtually all IBM-PC operating systems, applications software and peripheral, and is available for about one thousand dollars American.

For Canadian prices and availability, contact Emulex Corporation, 5945 Airport Road, Suite 288, Mississauga, Ontario L4V 1R9, telephone (416) 673-1211.

Circle No. 13 on Reader Service Card



● **Pure Data** has enhanced their **bubble memory boards** for the IBM PC family and compatibles to include such features as hard disk emulation and heightened security. These boards also feature the ability to boot from bubble, complete transparency to any version of DOS, and functionality with different operating systems.

The PDIB256, with 256KB of non-volatile bubble memory, will retail for \$1,695, while the PDIB512, with 512KB memory, will retail for \$2,495. For further information contact Pure Data, 860 Denison Street, Suite 12, Markham, Ontario L3R 4H1, telephone (416) 494-9563. Circle No. 14 on Reader Service Card

● The Above Board family of **memory enhancement boards** from **Intel** have recently been released. Expanding available workspace memory up to eight megabytes beyond 640K, Above Board uses only one slot and includes a print buffer, RAMdisk and menu-driven installation programs. Also included with the board is Intel's Expanded Memory Manager software which is implemented as a true DOS driver.

Price varies according to configuration. For further information and Canadian availability, contact Intel Corporation, 5200 NE Elam Young Parkway, Hillsboro, Oregon 97124, telephone (503) 629-7354.

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For further information contact Genamation, 351 Steelcase Road West, Markham, Ontario L3R 3W1, telephone (416) 475-9434.

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Waterloo Port, an **operating system designed for networking**, is now available from **Waterloo Microsystems**. Practical for very small networks of only two or three stations, and for up to one hundred stations, Waterloo Port offers full DOS compatibility, file and print services, a security system, crash recovery and user interface, and is available within two

Continued on page 83

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The Microcomputer Automotive Mechanic

The fact that cars have computers in them hasn't gone unnoticed by the people who fix them. This system used a PC to help find out what's wrong beneath the hood.

by Frank Lenk



Cars have come a long way in the past few years, but they're mostly still the same old horseless carriages we've come to know and... in some extreme cases... love.

The same thing could be said of the average automotive repair shop. It's still the same grease spattered, tool littered place that it's always been. However, there is a new tool that's recently begun appearing on the mechanic's bench.... a low grey box, with something like a TV set perched on top. It looks a lot like... an IBM PC. This is no coincidence, since it actually is a PC. How it came to be there is all tied up with the continuing evolution of the automobile, and with the business acumen of two companies, Micro Processor Systems Incorporated of Sterling Heights, Michigan, and Robco Industrial, of Markham, Ontario.

In the Beginning

Once upon a time... back in the dawn of technological prehistory... man discovered that certain underground strata were heavily laden with a kind of carbonaceous sludge. He named it... "oil". Lo and behold, man was so excited by his discovery that he built an entire civilization around it... especially the main mode of transport. This mode of transport he named "the car".

And behold, in the fullness of time... a century or so later, actually... it came to pass that the whole world was choked with these cars, and the effluents and corpses thereof. And it similarly came to pass that the once bountiful supplies of the life giving carbon sludge were all but exhausted, so that the car was now on the brink of extinction.

And behold... man had to rethink the whole situation, in one heck of a hurry.

Fortunately, man had simultaneously developed a very fancy technology in electronic control systems. This electronic science was called upon to come to the rescue of that great dinosaur, the car. No longer would the car be a mere gasoline guzzling brute. It would acquire intelligence.

Today it would probably be no exaggeration to say that many cars are smarter than their drivers. Current models contain up to about a half dozen microprocessor subsystems. The conflicting demands for greater fuel economy and reduced emissions have caused the old brute force engineering to yield to a more sophisticated approach. Electronic control has permitted many of the engine's operations to be dynamically tuned, greatly improving efficiency.

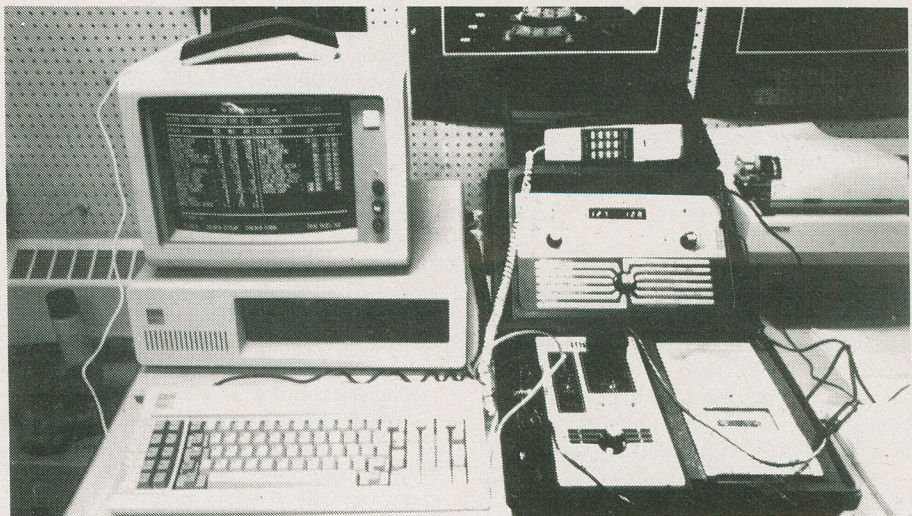
The Microcomputer Automotive Mechanic

The measure of this improvement can be seen in gas mileage figures. The 1974 models averaged only twelve miles per gallon. Today's cars have managed to achieve an average gas consumption of over twenty-seven miles per gallon.

Obviously, there's scope enough to write several volumes just on the implications of this automotive technology. Some of the new abilities hidden under the hood are quite startling. When I met Jim Robinson, of Robco, he was driving a Pontiac 6000 STE. This model is one of those that incorporates a built in learning capacity. The onboard computer actually tries to analyze the way the car is driven, and sets itself up to optimize its performance. The learn function would... for instance... help compensate if you went for some up and down driving in the high mountains. When you got back to the city, the system would readjust to stop and go traffic. If you're looking for artificial intelligence, you need only look no further than your driveway.

Other onboard systems are being designed to perform tasks like automatically trimming up the shock absorbers to level the vehicle, or to preset the interior comfort functions like temperature and seat configuration. Engine systems automated first... but the rest of the car is swiftly following.

This new technology is all very well...



The scanner and its PC host.

when it works. The trouble is, no matter how smart you make the ol' girl, every once in a while she's gonna break down. Although no technology has ever managed to eliminate all breakdowns, today's automotive computer technology can go a long way toward predicting and repairing the inevitable disruptions.

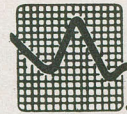
Robco is one company that is helping bring this capability to the local garage or repair shop.

Where Does It Hurt?

The problem of curing an ailing auto is practically solved once you have pinned down just what the problem is. Initially, the mechanic has little choice but to start with what you tell him. If you don't happen to be too expert in the field of automotive engineering, your guidance may turn out to be more hindrance than help. This will be particularly true if the mechanical symptoms are intermittent.



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The Microcomputer Automotive Mechanic

While you and the mechanic may not know just what's going on under the hood, the onboard computers probably have a pretty good idea. Those computer systems have the potential to provide all sorts of useful information about what goes on inside the machinery. The trick is getting all that information out to where a mechanic can use it.

The first solution to this problem came in the form of large console type 'scopes'... those things you typically see in the television ads, generating reams of impressive looking printouts. These do a fine job, as far as they go... but something that size just isn't likely to go all that far. Enter Micro Processor Systems and the Multi Scanner.

A simple device, the Multi Scanner is a briefcase sized box that can hook up to a car's onboard microprocessor system and provide dynamic information while the car is actually being driven. Although the scanner has no theoretical advantage over the big floor model scopes, it has the very practical advantage of portability.

Attaching the Multi Scanner is not particularly involved. The system comes packaged in a plastic attache case box. Opening this, one finds that the entire works occupy the bottom of the case, while the top stores electrical cables. The cable with the rectangular data jack is connected to an output hidden away under the car's dashboard. A second cable is plugged into the cigarette lighter socket to provide power for the scanner unit.

A second, smaller case contains the rest of the system. This one is the diagnostic data recorder. Half of this looks and acts a lot like a normal cassette tape recorder. Adjacent to the recorder is a small control unit. Once more there is a set of cables, one for power, one to get data from the Multi Scanner and a third one we'll come to later. Once you've got all the wiring in place, you... or the mechanic... drive away with it. An LED readout on the scanner gives one constant access to all the various operating variables. A dial selects which you want to monitor at the moment.

Here's what the Multi Scanner measures. For reference, it can read the PROM identification number. It accesses a number of trouble codes... error flags set by the car's system. On some new car models it also reads some other switch settings, including the park/neutral switch, the third gear and fourth gear switches, and the power steering switch.

What's really strange is to see the scanner reading some of the car's better known status levels. For instance, you can use the scanner like a digital tachometer to view the engine's RPM. You can even get a digital readout of the car's speed. Of course, these coarse kind of measurements don't really tell one what might be wrong with the car. However, they do pin down the troubled

operating range... perhaps between three and four thousand RPM, at forty miles per hour, or something like that. When suspect readings on some of the other parameters are found, they can be related to the specific conditions under which they occurred.

The more revealing readouts cover things like manifold air temperature, mixture control, solenoid dwell, vacuum sensor voltage, fuel load variable, spark advance reference and numerous others. Combining all these variables, the expert observer can get a complete picture of what the machinery is doing at any moment.

While all this is going on, the DDR recorder is making a permanent data transcription of the ride. While the scanner can show only a single variable at a time, the DDR copies down all of them for later use. The mechanic or driver can learn a lot from watching the scanner display, but his main function at this point is to watch for potential signs of trouble in the performance of the car. If any odd behavior shows up, he can make a note of the count on the tape footage indicator. The newer scanner will actually have a mark button, which will put a permanent reference mark on the data record itself.

Having gathered sufficient fodder for analysis, the test driver returns to the garage. In practice there would likely be some static tests done at the garage, either before or after the drive... checking things like idle speed, for instance.

This is where the PC comes in. Having accumulated a tape full of information, the mechanic heads for the desktop microcom-

ceivable that the microcomputer could actually be at a remote location. The package even includes a telephone handset for placing the call. However, with a local computer all you have to do is plug in the cable and boot the appropriate software.

The appropriate software in this case is a little seventy kilobyte file known as DDR35.EXE. This incorporates a communications facility. The simple menu reveals that F9 places a call, while F10 opens a direct connection to the DDR recorder. Uploading is a fairly leisurely process, considering that transmission on the present version is at three hundred baud, and a half hour tape will contain hundreds of complete pages of data.

Once it's all in there, you get the program's second major display. This is really the core of the whole system. It shows two columns, these being all the readouts from the car's system, each with the values for that particular sample. The operator can use the PgUp and PgDn keys to move forward or backward among the pages... each representing one complete time slice of your car's drive. Numbers can be entered at any time, followed by return to go directly to a page. Knowing approximately where the trouble spots were in the test drive, the mechanic can quickly locate the appropriate pages and get a complete view of what was going on in the car during that moment.

Hitting the F2 key from here gives access to the program's final option, the summary report. This display is much like the other, but presents minimum, maximum and average values for each of the car's



The portable recorder.

puter. The data can be ported into it through a standard modem connection. A telephone connector cable is provided with the DDR for just this purpose. Because the connection is by modem, it is quite con-

readouts. Selecting any of these with a highlighted cursor bar, one can go directly to the page on which the value occurred. The ability to locate the extreme value of any parameter serves as a further aid to

zeroing in on problem areas.

As of the current version of the software, that's about as far as the computer can take you. The actual analysis of the data and deduction of what mechanical conditions might have produced it is still a job for a human. It's a bit of an art. At least part of the reason for this is easy to explain. Few... if any... of the performance variables have rigidly defined correct values. Of course the switch readouts tend to be either on or off... but analog parameters will at most have a certain range of acceptable values. Even when the reading goes outside the range, it takes some insight to be sure that a mechanical fault was the cause. In many cases a reading could go well beyond its normal limit for relatively normal reasons.

Of course this is all in its early phases as yet. Next year's system is going to do a lot more. For one thing, GM will soon be offering its entire library of technical documents on disk. This will permit considerable integration, with a program like MPSI's at least suggesting comparisons between actual and book values. Software now being used by MPSI in the United States is also adding functions such as graphics.

The MPSI software actually points to one direction this will go. A utility supplied with DDR35 will convert DDR files to Lotus 1-2-3... or BASIC... formats. The system I saw in fact had a copy of Lotus parked next to it. Once these folks get started messing around with real business software like Lotus... who knows where it will end.

The distribution arrangement being pursued by Robco is based on the assumption that automotive shops will exhibit a certain amount of reluctance to computerize. Robco has the exclusive Canadian marketing rights for MPSI. Robco in turn sells systems to automotive parts distributors. Distributors try to sign up the individual service centres. The modem facility allows distributors to sell the system on the basis of remote computing access... allowing the service operation to phase things in gradually and spread out the cost quite a bit.

At this point, there are relatively few complete PC based scanner systems operating in Canada. The major customer... oddly enough... has been General Motors. Scanners alone... without PCs... are presently in use at all GM dealerships, most of the AC/Delco service distributorships and at many independent service centres. Cochrane Automotive, in Toronto, was the first service distributor in Canada to go by a complete PC.

The cost of acquiring a scanner is not trivial, but no doubt quite reasonable from the shops' point of view. The scanner unit itself goes for seven hundred and fifty dollars. The DDR recorder is eighteen hundred and fifty bucks with a modem, and a thousand and fifty without. The PC software

runs another three grand, with a modem included. The scanner has a dial to select configurations for all the model years up to its own date of manufacture. To keep up with the rapid changes in car technology, MPSI offers annual updates to scanner users. These cost between seventy-five and a hundred and twenty dollars, depending on the degree of change required that year.

MPSI sells scanners for all the major brands of cars, GM, Ford and Chrysler. The GM systems are the most powerful so far.

The present scanners are one way devices. They accept output from the car's

own system, and nothing more. However, as the car systems become more powerful, so will the scanners. The next big change will be the capability for two way communication. An operator will be able to effectively run the car from his little electronic console. He'll also be able to reprogram the built in computers, possibly rectifying any faults on the spot.

You can see where all this is leading. Eventually they'll replace the driver entirely, and we can all stay home while our cars drive around on their own. **CNI**

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An Address Book in Book in dBASE

If you have a typical paper address book... bristling with scraps of paper, gum wrappers and matchbook covers... you might well need this handy little program.

by Frank Lenk

```

ADDRESS BOOK
-----
Co. Name  Ittek Business Machines
Address   762 Gordon Baker Rd
          Willowdale ONT M2H 3B4 CAN
Telephone 416-497-0531
Comments  IBM clones, tape driv      HAN
-----
< Hit CTRL-W to Save & Exit >
-----
Bill Leary-
Fleming-Sls,Mktg

```

Unless you work down the sewer... presumably with the new, waterproof Neptune 9000 computer system... you probably end up communicating with many peculiar folks in the course of a business day. Keeping all these people sorted out can quickly become a problem of massive proportions.

At last there's help for bulging address books, this being the Computing Now! address book. This program, written in dBASE, allows you to transparently store company names and addresses, with an essentially unlimited number of individual contacts for each. You can easily print out an alphabetical listing of what's in the directory suitable for sticking in a loose leaf binder and trucking around the countryside. You could even print it on waterproof paper and take it down the sewer, if that's what you're in to.

How to Work It

Since the system is menu operated, there's little to explain. However, I'll enlarge a bit on what the various menu functions imply.

The first thing to do is to create some data files, according to what you'll find in listing three. Name these CONTACTS and NAMES. Avoid entering any records, initially. Index CONTACTS on NAME to COX, and index NAMES on CONUM to NUMBER.

Hit 1 to add new company listings to your database. You have to do these one at a time, returning to the menu after each one. Sorry about that. This will only be a problem if you're going to transfer in a bunch of listings all at once.

Hit 2 to find any desired listing, by company name. You'll be prompted for a name to search for. If the name isn't found, you'll have to try again. There's no escape but to find a name that will work. Once a listing is found, you'll see it taking over your screen. All the highlighted information may be edited, although there's no easy way to actually delete the whole record.

Hit 3 to print out an alphabetic address listing. This is the real beauty of the system, since it lets you take all that wonderful information with you wherever you go.

Hit 4 if you're bored with life and would like to end it all, or, at the very least, the program.

Since dBASE doesn't relate all that well to in line comments, I've kept the commentary in this listing a bit cryptic. However, if you refer to the section headings in the code, this should not be hard to follow.

The whole business is written in dBASE III. This made it easier to write, and should not be a serious impediment to dBASE II users, since none of the really neat new features of dBASE III have been used. However, if you plan to run this under dBASE II, you'll have to make some substitutions. All the SEEK statements will have to become FIND, and the SEEK variables will have to have an ampersand in front of them. The phrases SELECT 1 and SELECT 2 become SELECT PRIMARY and SELECT SECONDARY, respectively. The functions SUBSTR(), UPPER(), <>, RECNO() and EOF() become \$(), !(), #, # and EOF... the latter losing only the non-functional dBASE III bracket notation.

Just to show off, I've used SKIP -1 in the REPLACE EX-

An Address Book in dBASE

ISTING loop. This doesn't exist in dBASE II, so you have to first store your current location to a variable... as in

STORE # TO BLAT

Then instead of SKIPPING backward... GO BLAT. Oh, and by the way, variable assignment via the dBASE III *variable = value* has to go back to the awkward dBASE II *STORE value TO variable* form.

There are only two program modules. The first does all the hard work, while the second is solely responsible for printing your listings. Let's look at the main program first seen here in listing one.

First comes a bit of initialization, opening up a couple of appropriate data files. Then we launch right into a massive loop that executes perpetually, while T remains true, which is forever in dBASE. A bunch of @...SAY...GET statements creates a simple menu screen. Then a CASE structure sets things up for the task you've selected. Note that CASE CHOICE=3 shunts you over to the second program module, called PRINTOUT.

A second set of @...SAY statements displays your main company listing from the first data file. Then comes a rather finicky loop that displays up to twenty contact names from the second data file. This is one of the two tricky bits in this program, using

variables to allow information to be canvassed from the second database at the same time as the first. To run through twenty variables we must fake an array structure. This is done using the ampersand macro feature of dBASE. We start with a counter, CNT. Then the counter is converted to a string, ICNT. Finally, a series of variables, N1 through N20, is accessed by combining the N and the contents of ICNT, using the form N&ICNT.

The first CNT loop retrieves existing names, blanks any unused variables, and displays the whole mess on the screen. A series of three more takes over once the screen has been edited. These work much the same way as the first, but take the trouble to shove your edited variables back into the data file. The first of these *replace* loops replaces existing names in the file, and marks any that are deleted. The second loop takes over and fills in the deleted records... provided that it doesn't run out of names. Assuming you've added a bunch of names, a third loop comes to the rescue and creates as many new records as required to store things away.

The second program is much simpler. There's a long series of initializations, mainly because all the printer codes are stored in convenient variables. If you need to change these codes for your own printer, this is the only area you'll need to tamper with. The main loop merely puts up a prompt, then spews things out. **CN!**

```
M
Listing 1.
*****
*      Address Book Manager      *
*      (c) 1985      F Lenk      *
*      [ do not enter the      ] *
*      [ bracketed comments ] *
*****
* SET-UP STUFF *****
clear all                      [ close all files ]
set talk off
select 2
use names index number        [ the names data file ]
select 1
use conts index cox           [ the company data file ]
*
* FUNTION MENU *****
do while .T.
  clear
  CHOICE=0
  @ 2,20 say "FUNCTION MENU -- PICK ONE"
  @ 6,20 say "1. Add a New Company Listing."
  @ 8,20 say "2. Find/Modify Existing Listing."
  @ 10,20 say "3. Print Alphabetic Listing."
  @ 12,20 say "4. QUIT."
  @ 15,20 say "SELECTION => " get CHOICE picture "9" range 1,5
  read
* RETRIEVE OR CREATE NEW *****
select 1
do case
  case CHOICE=1
    append blank                [ add a new company record ]
  case CHOICE=2
    go bottom
    skip
    do while EOF()              [ get search string ]
      WHICH=space(30)
      @ 17,20 say "SEARCH COMPANY:" get WHICH
      read
      TWHICH=trim(WHICH)
      seek TWHICH               [ find company ]
    enddo
  case CHOICE=3
    do PRINTOUT                 [ go to subroutine ]
    exit
  case CHOICE=4
    exit                        [ give up ]
endcase
CURCO=recno()                  [ save Co. # for reference ]
clear
```

```
* DISPLAY AND EDIT *****
@ 1,18 say "ADDRESS BOOK"
@ 2,18 say "Co. Name" get Name
@ 4,18 say "Address" get Address
@ 5,18 say "City" get City
@ 6,29 get State
@ 6,46 get Code
@ 6,50 get Country
@ 8,18 say "Telephone" get Phone
@ 10,18 say "Comments" get Products
@ 10,58 get Type
@ 11,18 say "< Hit CTRL-W to Save & Exit ;"
@ 12,8 say "< Hit CTRL-W to Save & Exit ;"
>
* RETRIEVE AND DISPLAY NAMES *****
select 2
ROW=13
COL=8
CNT=1
DIG=1
seek CURCO
do while CNT<21
  ICNT=str(CNT,DIG)
  if Conum=CURCO
    N&ICNT=Name
    skip
  else
    N&ICNT=space(30)
  endif
  ROW=ROW+1
  @ ROW,COL get N&ICNT
  CNT=CNT+1
  if CNT=10
    DIG=2
  endif
  if CNT=11
    COL=42
    ROW=13
  endif
enddo
select 1
read
* REPLACE EXISTING NAMES *****
select 2
DIG=1
CNT=1
CONX=0
seek CURCO
* < replace existing names > *
do while CNT<21 .and. Conum=CURCO
  ICNT=str(CNT,DIG)
  if N&ICNT<>" "
    replace Name with N&ICNT
    CONX=CONX+1
  [ if names exist... ]
  [ and name not blank ]
  [ replace existing... ]
  [ ... and add count ]
```


An Address Book in dBASE

```

        skip
    else [ and name is blank! ]
        skip
        NEXX=recno()
        skip -1
        replace Conum with 9999 [ ...mark for re-use ]
        go NEXX
    endif
    CNT=CNT+1
    if CNT>9
        DIG=2
    endif
enddo
find 9999
* < replace blanked names > *
do while CNT<21 .and. Conum=9999 [ if blanks exist... ]
    ICNT=STR(CNT,DIG)
    if N&ICNT<>' ' [ ...and names left ]
        replace name with N&ICNT [ replace blank with ]
        replace Conum with CURCO [ new name listing. ]
        CONX=CONX+1
    endif
    find 9999
enddo
CNT=CNT+1
if CNT>9
    DIG=2
endif
enddo
* < add new name listings > *
do while CNT<21 [ if any names left ]
    ICNT=STR(CNT,DIG)
    if N&ICNT<>' ' [ ...add new record ]
        append blank [ and insert a name ]
        replace Name with N&ICNT
        replace Conum with CURCO
        CONX=CONX+1
    else
        endif
    CNT=CNT+1
    if CNT>9
        DIG=2
    endif
enddo
select 1 [ back to company database ]
replace Conz with CONX [ and update names count ]
release all
enddo
clear all [ tidy everything up ]
return [ ... and quit. ]

```

Listing 2.

```

*****
* Printer Output Module *
*****
*
* SET-UP STUFF *****
*
set talk off
LET1='A'
LET2='Z'
PRO=.T.
* < printer codes > * [ store away a whole ]
ESC=chr(27) [ mess of printer codes ]
TAB=chr(9)
FF=chr(12)
ELITE=ESC + '~'
EMON=ESC + '~' + ESC + 'E'
EMOFF=ESC + '~' + ESC + 'F'
LMARG=ESC + '~' + chr(12)
TMARG=chr(10) + chr(10) + chr(10) + chr(10)
PTABS=ESC + '~' + chr(46) + chr(63)
PREST=ESC + '~'
* < get parameter > * [ display prompts... ]
set intensity off
@ 17,20 say 'STARTING LETTER =>' get LET1 picture 'XX'
@ 18,20 say 'ENDING LETTER =>' get LET2 picture 'XX'
read [ ...and get ctrl info ]
LET1=upper(trim(LET1)) [ select start letter ]
LET2=upper(trim(LET2)) [ select end letter ]
set intensity on
* PRINT LOOP *****
clear
wait '>' HIT ANY KEY ONCE PRINTER IS ON-LINE ! <<
?
?
LETO=LET1 [ init current letter ]
SEL='S'
do while LETO>LET1 .and. LETO<LET2 .and. SEL<>'Q'
    seek LETO
    ?? '>' Printing listings for letter - '+LETO+' - <<

```

```

* < print control > *
? '>' Hit <Q> to quit, <S> for screen only <<
? '>' <P> to print with screen off. <<
wait '>' Any other key continues... << to SEL
?
?
SEL=upper(SEL)
do case
    case SEL='Q' [ quit ]
        exit
    case SEL='S'
        set print off [ do a dry run ]
    otherwise
        if SEL='P'
            set console off [ turn off screen for ]
            [ higher speed print ]
        endif
        set print on
        ?? PREST [ send out all of the ]
        ?? ELITE [ printer initialize ]
        ?? LMARG [ codes: reset, left ]
        ?? PTABS [ margin, top margin, ]
        ?? TMARG [ tabs, Elite pitch ]
        ?
    endcase
* < print one letter > *
select 1
LINES=0 [ init line counter ]
seek LETO
do while substr(name,1)=LETO
    CURCO=recno()
    if LINES+4+int(Conz/2)>58 [ if not enough space on ]
        ? FF [ current page, then ]
        ?? TMARG [ formfeed to next, ]
        LINES=0 [ and reset line count ]
    endif
    ?? EMON + trim(name) + EMOFF
    ?? TAB + trim(city) + TAB + EMON + phone + EMOFF
    ? ' ' + trim(address) + ' ' + state
    select 2
    seek CURCO
    do while Conum=CURCO [ print all names for ]
        ? ' ' + name [ current company. ]
        skip
        if Conum=CURCO
            ?? ' ' + name
            skip
        endif
    enddo
    ?
    ?
    select 1
    LINES=LINES+5+int(Conz/2) [ increment line count ]
    skip
enddo
? FF
LETO=chr(asc(LETO)+1) [ go on to next letter ]
set console on [ We now return control ]
set print off [ of your television set ]
enddo [ until next week at ]
return [ this same time... ]

```

Listing 3.

```

Structure for database : B:contacts.dbf
Number of data records : 109
Date of last update : 10/29/85
Field Field name Type Width Dec
1 NAME Character 32
2 ADDRESS Character 32
3 CITY Character 16
4 STATE Character 3
5 CODE Character 7
6 COUNTRY Character 3
7 PHONE Character 12
8 TYPE Character 3
9 PRODUCTS Character 25
10 CONTACT1 Character 25
11 CONTACT2 Character 25
12 CONTACT3 Character 25
13 MORE Numeric 3
** Total ** 212

Structure for database : B:names.dbf
Number of data records : 98
Date of last update : 10/29/85
Field Field name Type Width Dec
1 NAME Character 30
2 CONUM Numeric 4
** Total ** 35

```

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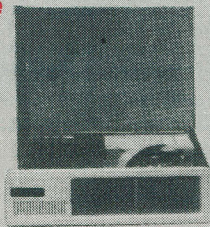
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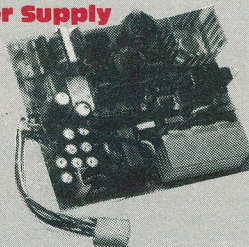
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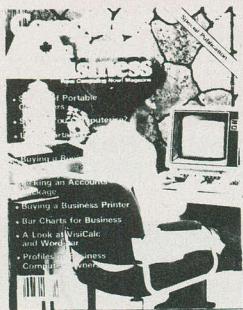
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For further information and pricing, Compuserve is located at 400 Alden Road, Markham, Ontario L3R 4C1, telephone (416) 477-8088, and has offices in major cities across Canada. Circle No. 18 on Reader Service Card

● An advanced version of Pure Data's ARC-NET interface board, the PD1508M, is now available for the IBM personal computer family and compatibles. With 512K of contiguous or segmented memory, this board will allow a PC to function as a full-fledged fileserver, as well as being an interface to ARCNET's token-passing local area network.

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● From RPTI International comes TRANS-NET, an IBM PC based local area network with an adapter board on PCs, XTs, ATs and compatibles. A high speed network, transparent to DOS, TRANS-NET requires a minimum of 128K per user and can network up to 255 users. Special features include peripheral sharing, onboard auto boot ROM, individual file/record locking with passwords and classroom monitoring.

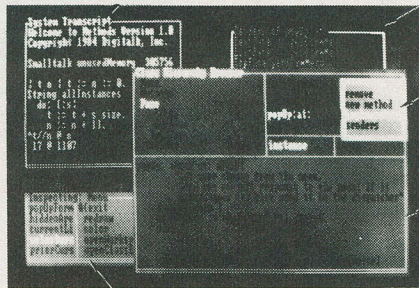
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For pricing and Canadian availability, contact Jim Anderson at Digitalk Incorporated, 5200 West Century Boulevard, Los Angeles, California 90045, telephone (213) 645-1082. Circle No. 21 on Reader Service Card



Apple Sauce

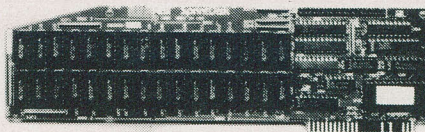
● Juice up your Apple IIc to 640K with the Z-RAM board from Applied Engineering, and run WordStar, and dBASE II, and 3,000 other CP/M programs. Shipped with the Desktop Expander software modification for Appleworks, Z-RAM is 100% compatible with Applesoft, Pro-DOS, DOS 3.3, Pascal and CP/M, as well as all Apple IIc hard and software.

Retailing for around five hundred and fifty dollars American, and four-fifty for the 256K version, the Z-RAM board is available from Applied Engineering, P.O. Box 798, Carrollton, Texas 75006, telephone (214) 241-6060. Circle No. 22 on Reader Service Card

● AST Research has recently released a new, solid-state memory expansion card for the Apple II and IIe personal computers. Combining the power of an electronic disk and disk caching software, SprintDisk speeds the operation of spreadsheets, word processing and data base management software. The standard configuration supports up to one megabyte of RAM and includes SprintCache, a fast, user-transparent cache software package that allows programs to run at RAM speed without modification. Fully compatible with ProDOS, DOS 3.3 and Pascal 1.3, SprintDisk will have a list price of under three hundred dollars American.

For Canadian availability and prices, contact AST Research at 2121 Alton Avenue, Irvine, California 92714.

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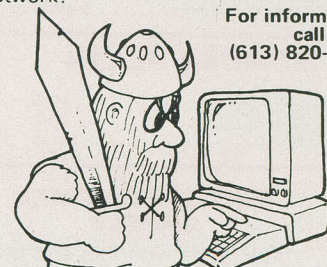
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We have the nicest case of all the various competing cases, ask any friend who has bought someone else's case and then has seen ours. The lid is hinged with pushbutton access. The back is cut for 8 XT slots and it comes with all the case back inserts for cards, card guides, blind disc filler plates, standoffs, feet, screws, all for **\$69.95**.

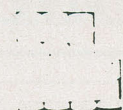
Please specify back or side cutout for power supply.

We also have an IBM 8 Slot/6502 Board dual duty case for making IBM look-a-like 6502 systems **\$79.95**



MEGABOARD CASE, similar to the above. Fits the MEGABOARD exactly for back power supply **\$99.00**

NICADS 8.4V 7 "D" 4A.H CELLS



A great buy, a pack of 7 brand new GE NICADS giving 8.4v at 4 Amp hours. Each cell is 12v and separates easy. Used as 5V backup through a 7805. Gives 5v 1 Amp for 4 hours.
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- (A) 384K RAM CARD. A 3/4 sized card that has 384K of 64K DRAM on board. With OK **\$ 89.95**
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- (K) I/O + 2. A clone of the very popular USA card of the same name. Has clock/calendar/alarm, with game I/O, serial and parallel ports **\$129.95**
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- (Q) GAME PORT CARD. Adds two std game I/O ports to the system **\$ 39.95**

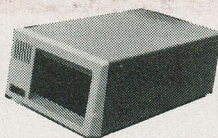
SYSTEMS

All SME-XT systems share these attributes.

- High order compatibility due to the DTC bios which is recognized superior to others.
- 8 Slots for plug in cards, just like IBM
- Made right here in Canada
- Socketed for the 8087 Co-processor
- IBM compatible serial keyboard
- Disc controller using 9216 IC, the most advanced, for error free operation.
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- Strong steel case with push-button operable flip-top hinged at rear for easy access to insides.

- (A) Base system, 256K, 1 DS, DD Drive & Controller, color graphics, 135W PS & Keyboard **\$ 995.00**
 - (B) Enhanced system, 640K 2 DS, DD Drives and Controller Color Graphics, Clock, Calendar, Serial, Parallel Ports, 135W PS & Keyboard **\$1295.00**
 - (C) HARD DRIVE OPTIONS
 - 10 Meg formatted with controller **\$ 799.00**
 - 20 Meg formatted with controller **\$ 999.00**
 - (D) IRWIN TAPE BACKUP OPTIONS
 - 10 Meg formatted, use your controller **\$ 799.00**
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- WITH IRWIN TAPE B/U UNIT ADD
- 10 Meg **\$ 799.00**
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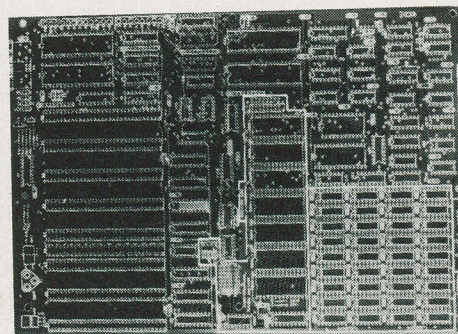
HARD DRIVE BOX



This nicely made box is ideal for externally mounted hard or floppy drives. It has space for one full height or two half height drives and power supply space at rear. This is a well made and rugged units for only **\$59.95**

NEW SME-XT 640K TO 1M BYTE

BARE PCB **\$39.95**
 WIRED WITH 256K **\$299.00**



In response to popular demand we have developed an upgrade of the famous MBE-XT board. The new board is called the SME-XT and has space for up to 1 Mbyte on board. The most popular configuration is 640K which is the IBM max addressable memory. The extra RAM above 640K is normally used for system purposes such as video lookup, ROM sitting, and other uses. However, we can supply proms to allow full use of this overhead space on demand. The 256K RAMS are more highly evolved than 64K RAMS and board using them have far fewer problems with parity errors. We have decided to maintain the low-price we pioneered with the MBE-XT and sell the new PCB at \$39.95 as well. All other attributes stay the same as the original IBM and the MBE-XT.

SME-XT **\$39.95**
 Manual and Schematic **\$ 4.95**

QUME

Yes we have the same QUME drives that IBM uses in their IBM-XT® system, 40 track, 1/2 height, double sided, double density. The exact ones you need to upgrade your old system or build your clone system up to the max. These are brand new drives that are from QUME's own inventory. They are absolutely perfect, at a perfect price of only **\$135.00**

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64K-200Ns DRAM **\$1.25**
 64K-150Ns DRAM **85¢**
 256K-150Ns DRAM **\$4.75**
 Set of 941256 **\$39.95**

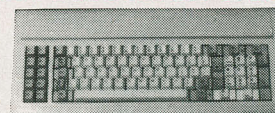
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110V, 60Hz with Fan and two rear switched outlets

These power supplies fit our cases.
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 Back Switch **\$135.00**
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KEYTRONICS 5150

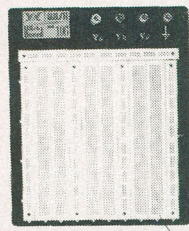


Yes the famous KEYTRONICS 5150 IBM® compatible keyboard. MADE IN USA. We bought a bunch and can sell them for only **\$119.00**

We also have some Taiwan copies that are quite good and all are checked for only **\$99.00**

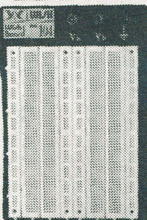
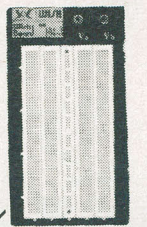
And lastly we have some Taiwan copies of the famous KEYTRONICS 5151 keyboard with all the same enhanced features for only **\$139.00**

SOLDERLESS BREADBOARD

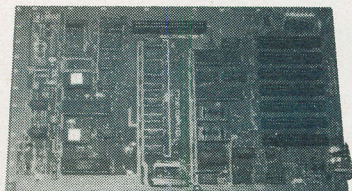


Solderless prototyping boards are the best way to quickly breadboard up a circuit. The holes are made especially for IC's, resistors, and other small parts with 22-28 gage wire leads, takes WW pins too.

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- 4 Binding posts, Aluminum plate
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- 2 IC strips, 1 power strip
- 2 Binding posts, aluminum plate
- WB-108\$49.95
- 4 IC strips, 7 power strips
- 4 Binding posts, aluminum plate
- WB-104\$29.95
- 2 IC strips, 4 power strips
- 2 Binding posts, aluminum plate.



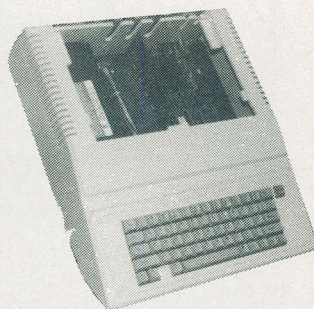
MOTHER BOARD



100% Iie® Compatible, for those of you who wish to build a clone of the very popular APPLE Iie®. This board is a reverse engineered copy of the Iie® and is 100% compatible. We have the motherboard and the custom ICs only. All other parts are widely sold. The custom ICs are workalike chips that do not infringe any copyrights. The software for operating the board must be obtained elsewhere as we do not have it for sale. When we say 100% we mean it.

- A very good buy at\$49.95
- Custom IC set(2)\$49.95
- Keyboard encoder (AY3-3600)\$14.95
- Character generator, U/LC\$14.95
- 48K 6502 Motherboard, same old 100% compatible 2+ clone\$29.95

Iie® ABS PLASTIC CASE \$59.95



This case is made to fit the Mother Board listed here for making Iie® clones and it makes a very nice looking copy. There is just enough difference to avoid design infringement. The case also has no brand names or other marks on it.

- A good buy at\$59.95
- ABS numeric case for 48K motherboard. Exact fit.\$49.95

APPLE Iie® DETACHED NUMERIC KEYBOARD \$99.00



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Iie® MATRIX KEYBOARD \$79.95



This keyboard fits the above case and has 100% clone compatibility, it will allow operation of all Iie® commands. Another bargain at\$79.95

2+ numeric keyboard for 48K mother boards, 100% comp, 88 basic functions for only\$69.95

Standard same as above\$69.95

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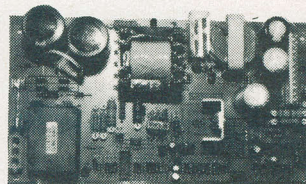
\$18.95 NEW IN BOX TESTED

AC power cable (3 Wire) for above\$2.50



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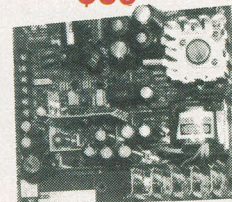
IBM POWER SUPPLY



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- 8255A-5 P.I.A.\$4.95
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6845 CRT controller\$9.50

6845 CRT controller\$9.95

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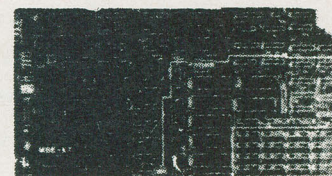
220 ohm trimpot\$.69

20 conductor ribbon cable\$.89/ft.

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MBE-XT BARE PCB WITH MANUAL AND SCHEMATICS.
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FULLY WIRED AND TESTED WITH 64K ON BOARD WITH MEGABIOS AND MANUAL

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- (G) Multifunction card 11 function\$24.95
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- (I) Parallel printer\$17.95
- (J) RS-232 card\$17.95
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